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DESIGN OF DENTAL AND ORAL CARE INFORMATION SYSTEM APPLICATION

Desain Aplikasi Sistem Informasi Perawatan Gigi Dan Mulut

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ABSTRAK

Layanan kesehatan gigi dan mulut adalah layanan perawatan yang direncanakan dalam jangka waktu tertentu secara berkelanjutan di bidang promotif, preventif, dan kuratif untuk meningkatkan tingkat kesehatan gigi dan mulut yang optimal pada individu, kelompok, dan masyarakat oleh terapis gigi dan mulut (TGM). Hasil survei awal sistem informasi puskesmas menunjukkan bahwa tidak ada catatan/pencatatan elektronik layanan kebersihan gigi. Oleh karena itu, perlu dirancang catatan kebersihan gigi elektronik yang terintegrasi dengan sistem informasi. Penelitian ini bertujuan untuk mendapatkan Sistem Informasi Perawatan Gigi dan Mulut di puskesmas. Desain sistem informasi dalam penelitian ini menggunakan pendekatan desain sistem prototyping yaitu pendekatan desain berbasis rekayasa modern, (proses interaktif yang melibatkan hubungan kerja yang erat antara desainer dan pengguna). Hubungan kerja antara desainer dan pengguna dilakukan melalui metode Focus Group Discussion, serta wawancara mendalam untuk mendapatkan informasi/pendapat/saran/masukan yang diperlukan dalam merancang aplikasi Sistem Informasi Perawatan Gigi dan Mulut yang akan digunakan oleh ahli kesehatan gigi di Kota Bandung. Penelitian ini melibatkan tim IT sebagai peneliti utama. Diharapkan desain Sistem Informasi Gigi dan Mulut memudahkan TGM dan pengurus di puskesmas dalam menjalankan tugasnya dan informasi dapat terhubung langsung dengan Dinas Kesehatan hingga Kementerian Kesehatan.

Kata kunci: aplikasi, desain sistem informasi, perawatan kesehatan gigi dan mulut

ABSTRACT

Dental and oral health services are treatment services that are planned over a certain period of time on an ongoing basis in the promotive, preventive, and curative fields to improve the optimal level of dental and oral health in individuals, groups, and communities by dental and oral therapists (TGM). The results of the initial survey of the Health center information system showed that there was no electronic record/recording of dental hygiene services. Therefore, it is necessary to design an electronic dental hygiene record that is integrated with the information system. This research aimed to obtain a Dental and Oral Care Information System at the Health Center. The design of the information system in this study uses the prototyping system design approach, which is a modern engineering-based design approach, (an interactive process that involves a close working relationship between designers and users). The working relationship between designers and users is carried out through the Focus Group Discussion method, as well as in-depth interviews to get the information/opinions/suggestions/inputs needed in designing the Dental and Oral Care Information System application that will be used by dental hygienists in the city of Bandung. This research involves the IT team as the main researcher. It is hoped that the design of the Dental and Oral Information System will make it easier for TGM and administrators at the Health Center to carry out their duties and information can be directly connected to the Health Office to the Ministry of Health.

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Keywords: applications, dental and oral health care,information system design

INTRODUCTION

Healthcare services are planned care services within a certain period of time on an ongoing basis in the fields of promotive, preventive, and simple curative to improve the degree of optimal dental and oral health in children. individuals, groups, and communities.[1]The Decree of the Minister of Health No. 284 of 2006 concerning the standard of dental and oral health care is a guideline that must be used by the Dental and Oral Therapist (DOT) in carrying out the task of providing Dental and Oral Health Care (DOHC) in order to achieve quality services.[2]

DOHC carried out by DOT turned into Dental and Oral Health Care at a dental health service where the DOHC diagnosis must be carried out based on eight human needs according to Darby and Walls, namely: 1. Not fulfilling the impression of a healthy face, 2. No fulfillment of being free from stress, 3. Not meeting the integrity of the soft tissue around the head and neck, 4. not fulfilling the risks to dental and oral health; 5. Not fulfilling the condition of intact teeth, 6. Not being fulfilled, being free from pain, aches, and pains. pain in the teeth, 7. Lack of knowledge about dental health is not fulfilled 8.[3,4] The responsibility for maintaining dental and oral health is not fulfilled, all the DOHC diagnoses must be carried out by the DOT in serve patients who come to the dental clinic/health center in accordance with The Decree of the Minister of Health No. 20 of 2016 concerning DOT competency. [1]

The results of the initial survey from *medical records* and in the health center recording system show DOHC services have not been included regarding the diagnosis of DOHC, it is necessary to have an electronic recording pattern of DOHC at this time, the recording system at the SIMpus should be integrated with DOHC which is the main competency of DOT. Public health centers, especially dental clinics, are expected to cooperate and propose to add electronic-based documentation of DOHC's recording menu. Therefore, it is necessary to have a way to design an electronic system to establish the DOHC diagnosis in order to achieve the planned care goals. The design of information systems on *smartphones* and computers is often used as an alternative solution for DOT for an activity that must be carried out and recorded. One of them is designing the DOHC information system. Therefore, the author wants to design a similar application that is more specifically intended to help DOT in the Health center establish a diagnosis.

This research aimed to obtain a Dental and Oral Care Information System at the Health Center. The result of making this application is the first step in developing applications that are expected to continue to be developed and equipped with other features. In the future, this application is expected not only to serve as a reminder for DOT, but also to provide information on *dental hygiene* related to the fulfillment of basic human needs in the field of dental health.

METHODS

This research is exploratory research, which is to explore opinions, experiences, and inputs from Dental and Oral Therapists (DOT), as well as clients. The design of information systems in this study uses a *prototyping-based* design approach *engineering* which is an iterative process that involves close working relationships between designers and users. The working relationship between designers and users has been carried out through the Focus Group Discussion (FGD) method as well as in-depth interviews to obtain information/opinions/suggestions/inputs needed in designing the DOHC

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Information System application to monitor DOHC activities on clients that will be used by DOTs in the City. Bandung.

The population in this study were all DOTs who practiced Dental and Oral Health Care. The sample in this study was taken by a total sampling of all DOTs who carry out the practice of Dental and Oral Health Care as many as 80 DOTs. The sample criteria (respondents) are DOTs who have *smartphones* that can open the DOHC information system program/software at the health center to monitor DOHC activities on clients.

Dental and oral health care is a planned dental and oral health service in limited promotive, preventive and curative fields, on an ongoing basis, to achieve optimal dental and oral health. The DOHC information system application is a reminder application that can be installed/activated on *smartphones* which are intended to monitor the realization of planned dental and oral health care for clients.

Program design tools consist of: computer or laptop, platform/application program design and programming, web/cloud hosting, and internet quota. The way it works is as follows: Stage 1: Identifying the problem described in the form of identification of the needs of the input process and the output process of the application of the Dental and Oral Health Care Information System. Stage 2: Creating a Flowchart (*Flowchart*), is a means or supporting equipment whose role is very important in programming because with a flowchart you can know the flow of a program. Stage 3: Creating *Database*, is the stage of creating a database according to the needs of the application to be made, using the Spreadsheet application. Stage 4: Programming (Algorithm Coding) is the stage where the programmer writes a program using one of the selected programming languages. The programming language used in this design is HTML 5 which has been simplified by the online application maker platform, Glide. This application can also integrate a database in the form of a spreadsheet with the DOHC information system application which will be used as a reminder/alarm application on the *mobile phone* of the client. Stage 5: Performing a Program Test is a program testing stage aimed at checking whether the program is completely free from errors, either writing errors, calculation errors or logical errors. If there is an error in the program, the programmer can make repairs or debug with the available facilities. Stage 6: Creating Program Documentation. After the program is free from errors, it's time to save the program on one of the online storage media (*cloud storage*) complete with the domain/web address of the application to be distributed to parties who need it.

RESULT

Application Design of Dental and Oral Health Information System, As mentioned in the previous chapter that the design of the DOHC Information System was made using a *prototyping* approach, namely a modern engineering-based design approach which is an iterative process that involves close working relationships between designers and users. So in the design process, researchers always discuss with DOT who will be the operator to determine the design of each design stage. The following is the design of the DOHC Information System application as a result of discussions with DOT.

Need for Input Process and Output Process

a. Input Process

This application requires three different roles for the data input process and instructions/orders that will be processed into the DOHC Information System which serves as a reminder for clients and operators

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of the dental and oral health care process that is being implemented. The three roles are registration, operator, and client, which are described as follows:

1) The registration section plays a role in inputting operator data in the form of names, phone numbers, and email addresses as well as managing operator access rights.
2) Operators are DOT's who will and are currently practicing Dental and Oral Health Care and whose role is to input client data in accordance with the needs of recording dental and oral health care used in the clinical practice of Dental and Oral Health Care Services.

b. Output Process

Broadly speaking, the data input process carried out by the registration department, operators and clients will be processed into the following information:

1) The registration section gets information on the recap of the number of clients served by each operator, a recap of the number of visits, and notifications of the DOHC Information System from each client who is served by DOT.
2) Operators get detailed information on dental and oral health care records from every client they serve.
3) Clients get information about the dental and oral health care interventions that they follow.

Flowchart

In order to know the flow of data from an application/information system can be done in various ways, one of the simplest is to use context diagrams. The following is a context diagram of the DOHC Information System application design according to the needs of the input process and the output process.

The application of the Oral Health Care Information System is designed to meet the monitoring needs of the implementation of dental and oral health care interventions carried out by service providers. From this context diagram, it is necessary to describe the input process and the output process from and to each user. Beginning at the registration section which inputs identity data and operator access rights so that the operator can perform the process of inputting client data in the form of demographic data to care planning, followed by the client filling in the *informed consent/refusal* and if the client agrees to the care to be provided, the operator can verify the informed consent and continue the intervention data input process. Next, the operator inputs data on the interventions that have been implemented and the results of their evaluations. In the final output process, the registration section will get a recap of the number of clients and the number of visits from each client, this information can be filtered by the operator to monitor the achievement of operator requirements.

Database

From the description of the needs of the input process, the output process, and the context diagram, the database needed by the design of this DOHC Information System application can be compiled. The database is compiled based on the grouping of data in records/cards for dental and oral health care. Each entity has a unique data component to be used as a primary key so that it can connect entities with other entities. The data table of each entity is named in the form of an acronym for that entity, while the component code is a combination of acronyms and column serial numbers (a description of each component code can be seen in

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Appendix 2). The design of the DOHC Information System application database can be seen in the following figure.

Entitas	Tabel	Kode Komponen
Identitas Operator	IDO	IDO1, IDO2, IDO3, IDO4, IDO5, IDO6, IDO7, IDO8, IDO9, IDO10, IDO11, IDO12, IDO13, IDO14, IDO15
Identitas Klien	IDK	IDK1, IDK2, IDK3, IDK4, IDK5, IDK6, IDK7, IDK8, IDK9, IDK10, IDK11, IDK12, IDK13, IDK14, IDK15, IDK16, IDK17, IDK18, IDK19, IDK20, IDK21, IDK22, IDK23, IDO13
Riwayat Kesehatan (Medical History)	MH	MH1, MH2, MH3, MH4, MH5, MH6, MH7, MH8, MH9, MH10, MH11, MH12, MH13, MH14, MH15, MH16, IDK1, IDO13
Riwayat Sosial (Social History)	SH	SH1, SH2, SH3, SH4, SH5, SH6, SH7, SH8, SH9, SH10, SH11, SH12, SH13, SH14, SH15, IDK1, IDO13
Riwayat Kesehatan Gigi I (Dental History I) Pengalaman Kesehatan Gigi dan Gejala-gejalanya	DHI	DHI1, DHI2, DHI3, DHI4, DHI5, DHI6, DHI7, DHI8, DHI9, DHI10, DHI11, DHI12, DHI13, DHI14, DHI15, DHI16, DHI17, DHI18, DHI19, DHI20, DHI21, DHI22, DHI23, DHI24, DHI25, DHI26, DHI27, DHI28, DHI29, DHI30, DHI31, DHI32, DHI33, DHI34, DHI35, DHI36, DHI37, DHI38, DHI39, DHI40, DHI41, DHI42, DHI43, DHI44, DHI45 ,IDK1, IDO13
Riwayat Kesehatan Gigi II (Dental History II) Pemeliharaan Kesehatan Gigi dan Mulut Sendiri	DHII	DHII1, DHII2, DHII3, DHII4, DHII5, DHII6, DHII7, DHII8, DHII9, DHII10, DHII11, DHII12, DHII13, DHII14, DHII15, DHII16, DHII17, DHII18, DHII19, DHII20, DHII21, DHII22, DHII23, DHII24, DHII25, DHII26, DHII27, DHII28, DHII29, DHII30, DHII31, DHII32, DHII33, DHII34, DHII35, DHII36, DHII37, DHII38, DHII39, DHII40, DHII41, DHII42, DHII43, DHII44, DHII45, DHII46, DHII47, IDK1, IDO13

Entitas	Tabel	Kode Komponen
		45, 46, 47, 48, 51, 52, 53, 54, 55, 61, 62, 63, 64, 65, 71, 72, 73, 74, 75, 81, 82, 83, 84, 85, IDK1, IDO13
Skor Kalkulus	SK	11, 12, 13, 14, 15, 16, 17, 18, 21, 22, 23, 24, 25, 26, 27, 28, 31, 32, 33, 34, 35, 36, 37, 38, 41, 42, 43, 44, 45, 46, 47, 48, 51, 52, 53, 54, 55, 61, 62, 63, 64, 65, 71, 72, 73, 74, 75, 81, 82, 83, 84, 85, IDK1, IDO13
Diagnosis Askesgilut, Perencanaan, Intervensi, Evaluasi	DHD	DHD1, DHD2, DHD3, DHD4, DHD5, DHD6, DHD7, DHD8, DHD9, DHD10, DHD11, IDK1, IDO13
Informed Consent/Refusal	IC	IC1, IC2, IC3, IC4, IC5, IC6, IC7, IC8, IC9, IC10, IC11, IC12, IC13, IC14, IC15, IC16, IC17, IC18, IC19, IC20, IDK1, IDO13

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Entitas	Tabel	Kode Komponen
Riwayat Kesehatan Gigi III (Dental History III) Cemilan Diantara Waktu Makanan	DHIII	DHIII1, DHIII2, DHIII3, DHIII4, DHIII5, DHIII6, DHIII7, DHIII8, DHIII9, DHIII10, IDK1, IDO13
Riwayat Kesehatan Gigi IV (Dental History IV) Keyakinan Tentang Kesehatan Gigi dan Mulut	DHIV	DHIV1, DHIV2, DHIV3, DHIV4, IDK1, IDO13
Riwayat Obat-obatan (Pharmacologic History)	PH	PH1, PH2, PH3, PH4, PH5, PH6, PH7, PH8, IDK1, IDO13
Tanda-tanda Vital	TTV	TTV1, TTV2, TTV3, IDK1, IDO13
Diagnosis Askesgitut (Dental Hygiene Diagnosis)	DHD	DHD1, DHD2, DHD3, DHD4, DHD5, DHD6, DHD7, DHD8, DHD9, DHD10, DHD11, IDK1, IDO13
Oral Hygiene Indeks - Simplified (OHI-S)	OHI-S	GI1, GI2, GI3, GI4, GI5, GI6, DI1, DI2, DI3, DI4, DI5, DI6, SI1, CI1, CI2, CI3, CI4, CI5, CI6, SCI, OHI-S, KOHI-S, IDK1, IDO13
Plaque Control Score hasil menyikat gigi sendiri	PCS	GI1, GI2, GI3, GI4, GI5, GI6, GI7, GI8, GI9, GI10, GI11, GI12, GI13, GI14, GI15, GI16, GI17, GI18, GI19, GI20, GI21, GI22, GI23, GI24, GI25, GI26, GI27, GI28, GI29, GI30, GI31, GI32, SGI1, SGI2, SGI3, SGI4, SGI5, SGI6, SGI7, SGI8, SGI9, SGI10, SGI11, SGI12, SGI13, SGI14, SGI15, SGI16, SGI17, SGI18, SGI19, SGI20, SGI21, SGI22, SGI23, SGI24, SGI25, SGI26, SGI27, SGI28, SGI29, SGI30, SGI31, SGI32, PCS, KPCS, IDK1, IDO13
Oral/Facial Soft Tissue	OST	OST1, OST2, OST3, OST4, OST5, OST6, OST7, OST8, OST9, OST10, OST11, OST12, OST13, OST14, OST15, OST16, OST17, OST18, OST19, OST20, OST21, OST22, OST23, OST24, OST25, OST26, OST27, OST28, OST29, IDK1, IDO13
Jaringan Keras Gigi (Odontogram)	OG	11, 12, 13, 14, 15, 16, 17, 18, 21, 22, 23, 24, 25, 26, 27, 28, 31, 32, 33, 34, 35, 36, 37, 38, 41, 42, 43, 44, 45, 46, 47, 48, 51, 52, 53, 54, 55, 61, 62, 63, 64, 65, 71, 72, 73, 74, 75, 81, 82, 83, 84, 85, IDK1, IDO13
Periodontal Bleeding on Probing	BOP	11, 12, 13, 14, 15, 16, 17, 18, 21, 22, 23, 24, 25, 26, 27, 28, 31, 32, 33, 34, 35, 36, 37, 38, 41, 42, 43, 44, 45, 46, 47, 48, 51, 52, 53, 54, 55, 61, 62, 63, 64, 65, 71, 72, 73, 74, 75, 81, 82, 83, 84, 85, IDK1, IDO13
Periodontal Attachement Loss	AL	11, 12, 13, 14, 15, 16, 17, 18, 21, 22, 23, 24, 25, 26, 27, 28, 31, 32, 33, 34, 35, 36, 37, 38, 41, 42, 43, 44, 45, 46, 47, 48, 51, 52, 53, 54, 55, 61, 62, 63, 64, 65, 71, 72, 73, 74, 75, 81, 82, 83, 84, 85, IDK1, IDO13
Poket Dalam	PD	11, 12, 13, 14, 15, 16, 17, 18, 21, 22, 23, 24, 25, 26, 27, 28, 31, 32, 33, 34, 35, 36, 37, 38, 41, 42, 43, 44,

Figure 1. The design of the DOHC Information System application database

In the figure 1, it can be seen that in every entity (except the operator entity) the IDK1 code (Client Identification Number) is always included which indicates that the data on the entity belongs to a client. The code is also used as the primary key. In addition to IDK1, each entity also includes an IDO13 code, which is the operator's email address used to log in so that it can be seen who the operator is who inputs or edits the data.

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DISCUSSION

Application Design of Dental and Oral Health Information System Applications

From several application options that will be used to create an information system as described in the literature review, the three supervisors chose to use the Glide platform because it is considered easier to use and does not require the makers to master programming languages (*coding*). Glide also has the advantage of directly presenting a preview in *real-time* such as the appearance of the application when it is opened/used on a cellphone/smartphone even though the application is still in the process of being built.[5]While for database storage, Google Sheets is chosen so that it can be integrated with various additional applications/add-ons or can take advantage of the spreadsheet features to make the necessary recaps or graphs. (18) The mobile version of this application is named My Dental Hygiene Care so that clients can also use it directly.

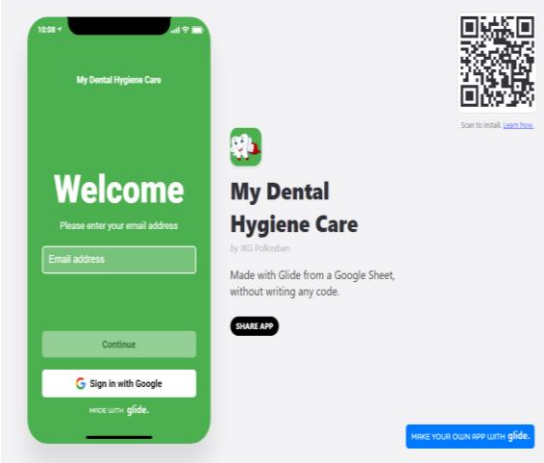

Figure 1. Display Menu Login Application Information System Dental and Oral Health

In this login view, it can be seen that operators can log in using a Google account. This can ease the admin's burden in inputting operator data so that the registration section simply regulates access rights as an operator to the logged-in user (Figure 1).

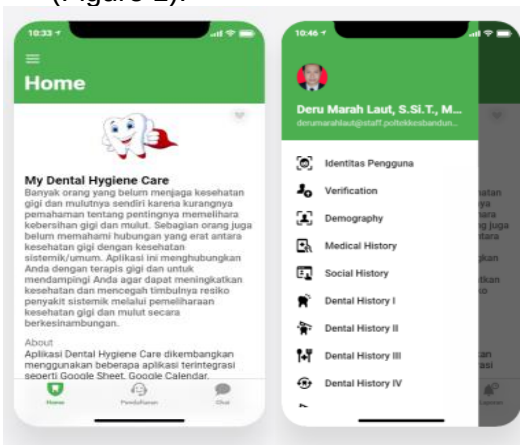

Figure 2. Display After Login Application and Operator Menu List on Application Information System for Dental and Oral Health

Figure 3. Display of User List Display and Verification Menu on Application of Dental and Oral Health Care Information System

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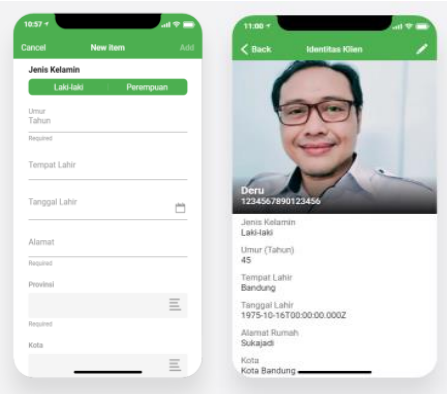

Figure 4. Display Demographic Data Input Menu on Dental and Oral Health Care Information System

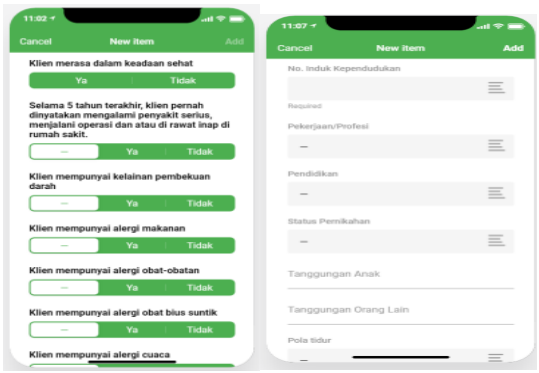

Figure 5.Medical History and Social History Data Input Display on Dental and Oral Health Care Information System Application

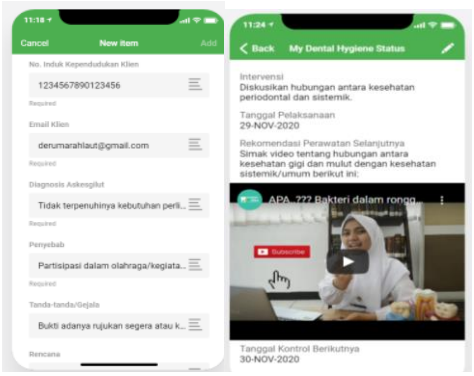

Figure 6. Display of DOHC Diagnostic Client's Intervention and Education Menu on Dental and Oral Health Information System Application

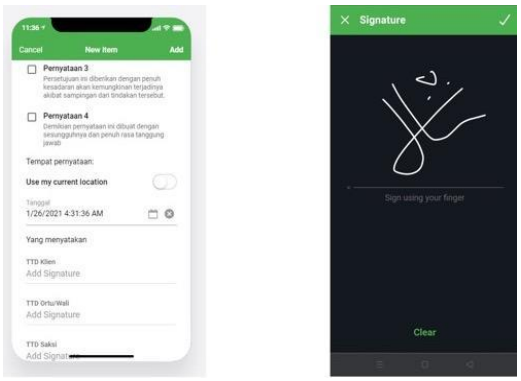

Figure 7. Informed Consent Menu on the Application Dental and Oral Health Care Information System

After the interface design is completed, the next step is to document the application in a safe “container” or “place” so that the data and information contained in it are safe and can be accessed again when needed. The results of the discussion with DOT agreed that the application interface is still stored on the Glide platform so that it can be easily accessed by users and developers, while the database continues to use the Google Sheet facility which already has security features and ease of backup process on an *enterprise*.[6] For the time being this application utilizes the basic features of Glide where the application link address still uses the glideapp.io domain. The application is also packaged in apk format so that it can be installed directly on an Android cellphone/smartphone so that users do not need to remember the application link address.[5]

The design of the DOHC Information System application cannot be said to be perfect if it has not been tested. The trial also aims to find out the perceived shortcomings from the user's side in real terms. For this reason, in this study, a trial of the use of applications carried out by DOT as an operator was also carried out. In this trial, the operator registers himself first by logging in using his email address and then filling in the identity form and requesting access rights as an

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operator(Figure 1, Figure 2, Figure 3).

After being verified by the admin, the operator then begins to fill in client data ranging from demographic data to health insurance planning (figure 4). The DOHC plan is explained to the client and if agreed, the client fills out and signs the informed consent on the application that is accessed from the operator's device. Then the operator confirmed and signed the informed consent (figure 7).

For operators who find deficiencies related to the input process that takes quite a long time, this can be overcome if part of the client data input process can be carried out by the client himself, for example, demographic data, medical history, dental health history or other subjective data. Of course, the use of sentences/languages from each of the data components must be reviewed so that the client easily understands and answers according to the purpose of the question. For the problem of the specifications of the device used, this application actually does not require a specification that is too high, it can even run only by using the browser/browser application that is available on each device. Likewise with the DOHC information system application, every device, both Android and IOS, has made the information system application a factory default application, in other words, the manufacturer has measured the ability of the device it produces to run the application. Perhaps the operator who expressed this opinion happened to be using a device whose memory capacity was already full of other applications so when opening the DOHC Information System application, it was laggy. Obstacles to accessing the application will also arise if the android or IOS version used does not comply with the *minimum operating system requirements* as quoted from the official website, the Glide platform recommends the Android Oreo 8.0.0 phone operating system or the latest for Android phones and iOS 11 or the latest. for iPhone.[5]

For clients who complain of disturbing alarms when they are doing other activities, it can actually be overcome by changing the temporary settings to disable/mute notification sounds or alarm ringtones on their devices. However, it is also necessary to remind the client to reactivate after they are done with the activity. Setting the reminder alarm schedule has also actually been agreed/approved by the client when he signed the informed consent because beforehand the operator must explain in advance about the care interventions that must be followed by the client, if he does not agree the client can determine the schedule according to his needs/wants and the operator has no right to impose his will on the client.

What are your suggestions for the development of the dental and oral Health Information System application?

> “even more shortened for in-app questions..."
>
> DOT 15
>
> “For future development, it should be integrated with other health facilities such as independent clinics, health centers or hospitals...”
>
> DOT 38
>
> “My suggestion is that this app can add a feature to remind the next visit schedule for clients/patients”
>
> TGM 71

CONCLUSION

It is hoped that the design of the Dental and Oral Information System will make it easier for TGM and administrators at the Health Center to carry out their duties and information can be directly connected to the Health Office to the Ministry of Health.

Judging from the suggestions given by

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users, this application is indeed expected to be further developed by paying attention to additional features such as integration with other health facilities, the use of language/questions that are easier for clients to understand so that clients can fill in the subjective data needed by themselves. for the assessment of DOHC as well as guidelines for using the calendar application for clients so that clients can set their own reminder alarm sounds as needed so they don't interfere with other activities.

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