DESIGN OF DENTAL AND MOUTH CARE INFORMATION SYSTEM APPLICATION DESIGN

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Abstract, **Background**: Dental and oral health care services (Askesgilut) are planned care services within a certain period of time on an ongoing basis in the simple promotive, preventive, and curative fields to improve the degree of optimal dental and oral health in individual groups, and the community by a dental and oral therapist (TGM). The results of the initial survey from the medical record or public Health Center information system show that there is no electronic record/recording of Askesgilut services, it is necessary to design an electronic Askesgilut record that is integrated with the information system. This study aims to obtain the design of the Askesgilut TGM information system at the Public Health Care.
Method: The design of the information system in this study uses a prototyping system design approach, namely a modern engineering-based design approach which is an interactive process that involves close working relationships between designers and users. The working relationship between designers and users is 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 Askesgilut Information System application that will be used by TGM in Bandung City. This research involves the IT team as the main researcher.
Result: The results of making this application are the first step in developing the Askesgilut application in order to facilitate TGM in carrying out its main tasks.
Conclusion: It is hoped that the design of the Askesgilut Information System will not only make it easier for TGM at the Public Health Care in carrying out their duties, but also can be used by the management at the public Health Center, which can then be directly connected to the Health Office to the Ministry of Health.

Keywords: Information System Design, Dental and Oral Health Care, Applications

Background

Health care 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. Individual group and communities (Permenkes 20/2016) have been described 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 (TGM) in carrying out the task of providing Dental and Oral Health Care (Askesgilut) in order to achieve quality services.

Askesgilut carried out by TGM turned into Dental and Oral Health Care dental hygiene care at a dental health service where the Askesgilut 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 in the teeth, 7. Lack of knowledge about dental health is not fulfilled, 8. The responsibility for maintaining dental and oral health is not fulfilled. All the Askesgilut diagnoses must be carried out by the TGM in serve patients who come to the dental clinic/Public Health Care in accordance with Permenkes 20 of 2016 concerning TGM core copetency.

The results of the initial survey from medical records and in the Public Health Care recording system show Askesgilut services have not been included regarding the diagnosis of Askesgilut, it is necessary to have an electronic recording pattern of Askesgilut at this time, the recording system at the SIMpus should be integrated with Askesgilut which is the main competency of TGM. Public health centers, especially dental clinics, are expected to cooperate and propose to add electronic-based documentation of Askesgilut's recording menu. Therefore, it is necessary to have a way to design an electronic system to establish the Askesgilut 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 TGM for an activity that must be carried out and recorded. One of them is designing the Askesgilut information system. Therefore, the author wants to design a similar application that is more specifically intended to help TGM in the Public Health Care establish a diagnosis.

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 TGM, but also to provide information on dental hygiene related to the fulfillment of basic human needs in the field of dental health.

Method

This research is exploratory research, which is to explore opinions, experiences, and inputs from Dental and Oral Therapists (TGM), 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 Askesgilut Information System application to monitor Askesgilut activities on clients that will be used by TGMs in the Bandung City.

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

Result and Discussion

Application Design of Dental and Oral Health Information System, As mentioned in the previous chapter that the design of the Askesgilut 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 TGM who will be the operator to determine the design of each design stage. The following is the design of the Askesgilut Information System application as a result of discussions with TGM.

1. 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 Askesgilut Information System which serves as a reminder for clients and operators 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:
      - 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.
      - Operators are TGMs 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:
      - 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 Askesgilut Information System from each client who is served by TGM.
      - Operators get detailed information on dental and oral health care records from every client they serve.
      - Clients get information about the dental and oral health care interventions that they follow.

2. 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 Askesgilut 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.

3. 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 the Askesgilut 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 Appendix 2). The design of the Askesgilut Information System application database can be seen in the following table.

   Table 1. System application database

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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 1) 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
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 Askesgilut (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, SDI, 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 Attachment 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,

| 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

Table 2. Component Code

In the Table above, it can be seen that in every entity (except the operator entity) the IDK1 code (Client Resident 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.

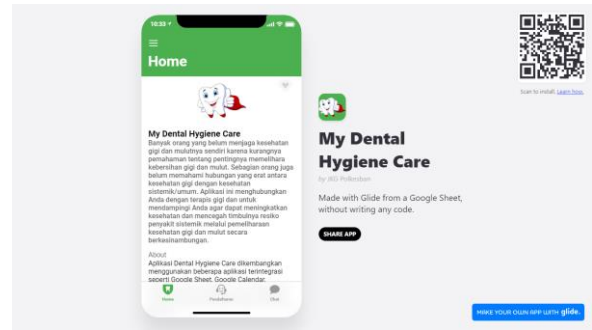4. Application Design of Dental and Oral Health Information System Applications

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.[15] 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.

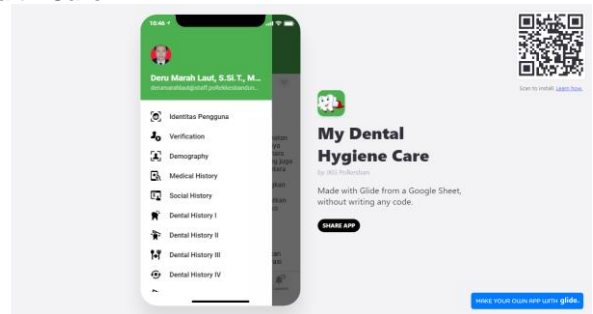**a. Display Menu Login Application Information System Dental and Oral Health**
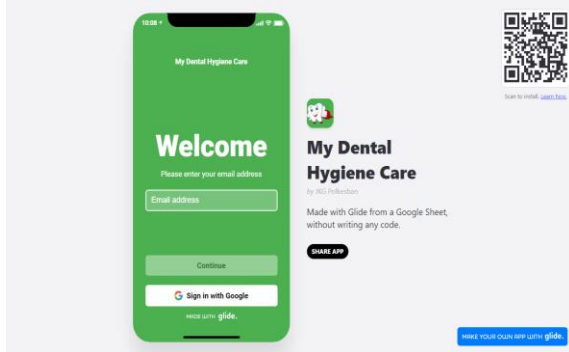
In this login view, it can be seen that operators can log in using a Google account. This can ease the admin's burden in inputting operator data so that the registration section simply regulates access rights as an operator to the logged-in user.
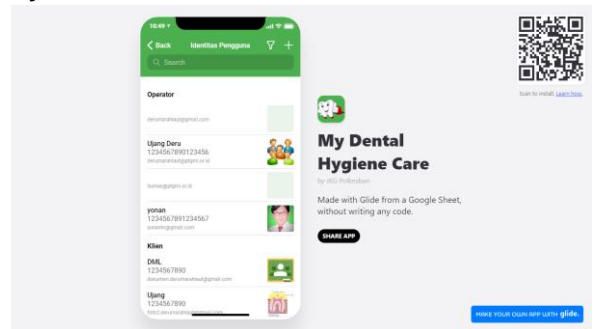
b. Display After Login Application Application Information System for Dental and Oral Health

c. Display of Operator Menu List on Application of Information System for Oral Health Care
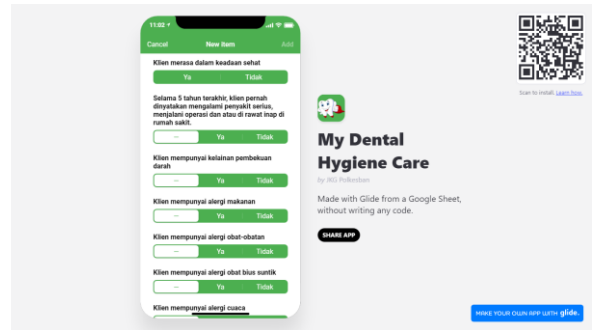

d. Display of User List on Application of Dental and Oral Health Care Information System
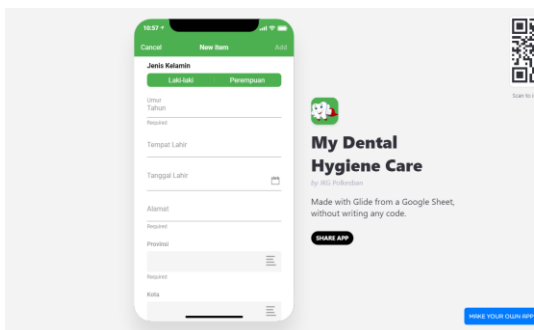

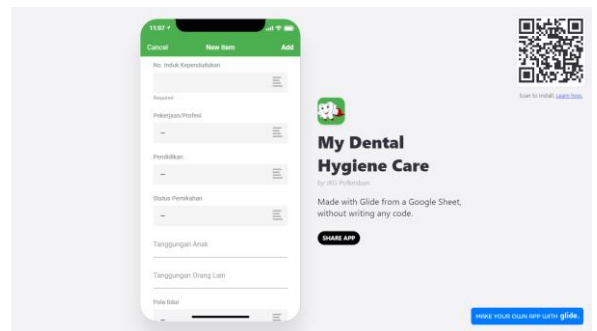**e. Display of Verification Menu on Application of Dental and Oral Health Care Information System**

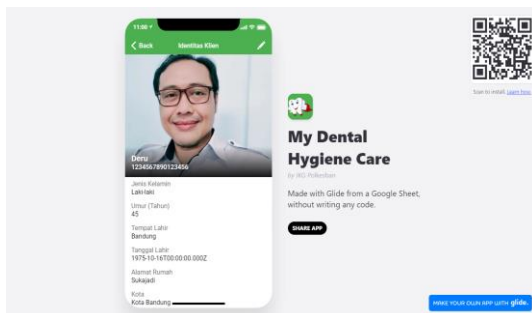**f. Display Demographic Data Input Menu on Dental and Oral**

g. Health Care Information System Application Demographic Data Display on Dental and Oral

h. Health Care Information System Application Medical History Data Input Display on Dental and Oral Health

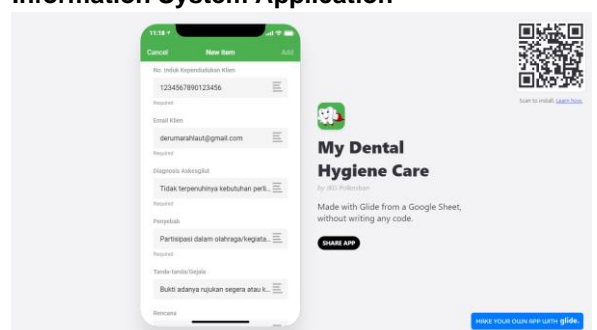**i. Data Input Display *Social History* on Health Care Information System Application teeth and mouth**

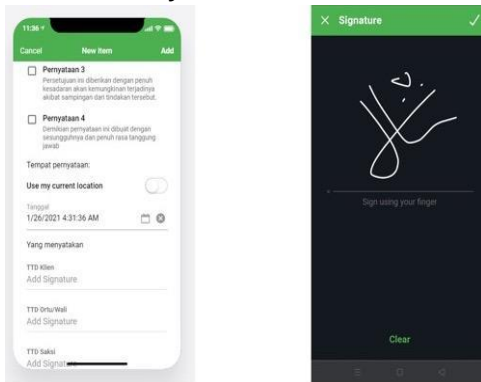**j. Display of Askesgilut Diagnostic Data Input on Dental and Oral Health Information System Application**

k. Client's Intervention and Education Menu Display on
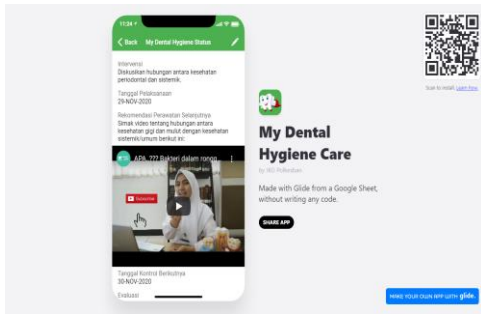
I. Informed Consent Menu on S Application Dental and Oral Health Care Information System

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 TGM 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*.[18] 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.[15]

The design of the Askesgilut 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 TGM 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 operator. After being verified by the admin, the operator then begins to fill in client data ranging from demographic data to health insurance planning. The Askesgilut 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.

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 Askesgilut 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 Askesgilut 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.[15]

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

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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?

> "lebih dipersingkat lagi untuk pertanyaan dalam aplikasi…"
>
> TGM 15
>
> "Untuk pengembangan ke depannya sebaiknya bisa diintegrasikan dengan fasyankes lain seperti Klinik Mandiri, Public Health Care atau Rumah Sakit..."
>
> TGM 38
>
> "Saran saya aplikasi ini dapat ditambahkan fitur untuk pengingat jadwal kunjungan berikutnya bagi klien/ pasien"

Judging from the suggestions given by 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 Askesgilut 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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