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Health and Wellbeing Consultation System (HBCS): Promoting Flexibility in Managing Disease and Medical Appointment

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Abstract : With the growth of technology, people nowadays depend on systems that help to assist, organize and solve their daily routines and problems. In today's hectic and challenging life, we need a reliable platform to consult about healthcare more efficiently. The Health and Wellbeing Consultation System (HBCS) is developed in order to replace the existing manual system due to limitations of manual systems and procedures. The traditional method of gaining consultation, awareness, relevant information, appointments and treatments can sometimes be ineffective due to time and space constraints compared to utilizing consultations or booking systems. The HBCS can be a quick platform to obtain quick, relevant medical information and awareness. For example, users may select diseases and obtain crucial information such as the names, causes, symptoms, related information and options of potential treatment. Specific information can be hard to obtain yet very essential in our daily life. The main objective of HBCS is to provide a quick platform in consulting, obtaining information, awareness, as well as seeking for urgent advice, treatments and medications. Rapid Application Development (RAD) is used to develop the system. This methodology consists of four stages, namely requirement planning, user design, rapid construction and cutover phases. First, the functional requirements were gathered through interviews and content analysis. Then, the HBCS was developed based on the gathered requirements. A field study was carried out to evaluate the usability of the prototype. The results of the evaluation suggest that the HBCS is useful and easy to use. The study contributes towards an understanding of the system requirements and user interfaces of a Web-based system for booking and consultation purposes in supporting health and wellbeing demands. It can be a reference model for similar Web applications or enhance the capabilities in treating and managing patients better.

Keywords: healthcare, medical advise, medical awareness, consultation system, manage disease, book appointment

1. Introduction

Health and Wellbeing Consultation System (HBCS) is a web-based system for users to consult about their healthcare. HBCS was developed in order to replace the existing manual system due to limitations of manual systems and procedures. The aim of the system is to instil awareness about diseases, allow people to consult, obtain the right information, treatment and medications. The goal of HBCS is to provide a quick platform in consulting, obtaining information, awareness, as well as seeking for immediate advice, treatments and medications. **Figure 1** shows the HBCS homepage and **Figure 2** shows an example of HBCS disease page.
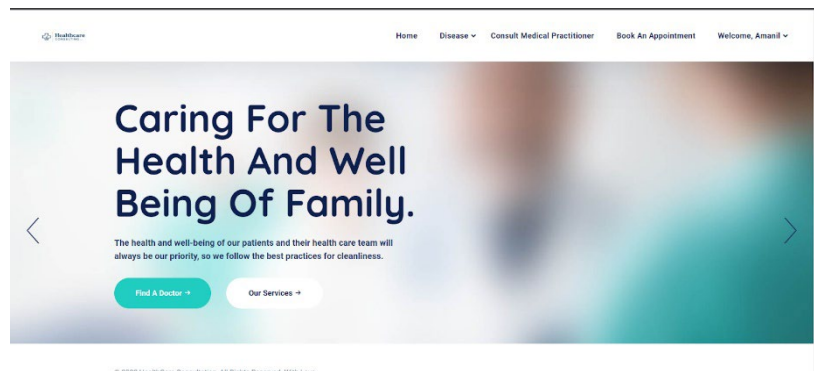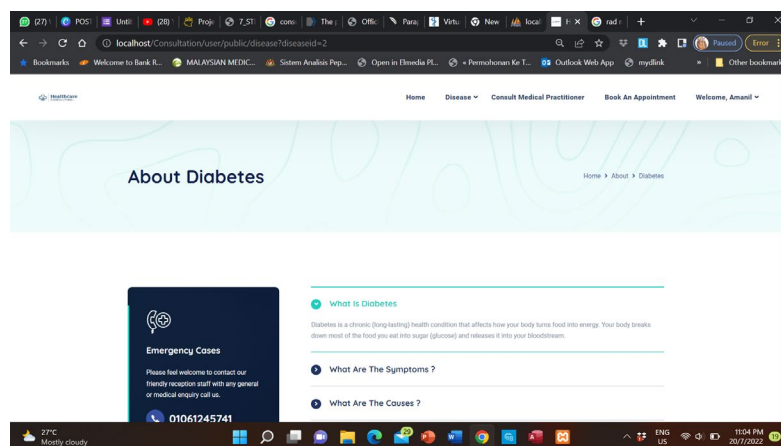

Figure 1: HBCS Homepage

Figure 2: HBCS Disease Page

All users need to be registered first in utilizing the system. During a medical consultation, the medical practitioner attempts to determine whether or not the patient is unwell. He will attempt to suggest on possible diagnosis so that appropriate investigation, treatment, or review may be scheduled. Medical practitioners understand that attentive listening to a patient's history of health problems as well as existing complaints and medical conditions would provide the bulk of the information pointing to a proper diagnosis [1]. In this work, a quick platform is provided to ease communication and consultations between patients and medical practitioners. **Figure 3** prompts a possible beginning query that shows the need of quick consultation between users and medical practiotioners virtually.

It has been reported that many consultations will remain virtual as one of the impacts of the COVID-19 pandemic; virtual clinics are proving a number of advantages as technology is evolving rapidly. Although there could be some disadvantages involving technological and emotion barriers, advantages in saving time, ease of travel and time off work have made it convenient for most people nowadays [2].

On the other hand, another review reported that convenience, privacy, shift in disease patterns, second opinion and cost effective are factors led to a transition and demand towards online medical consultation [3]. Other than suggesting a personal rapport building during virtual medical conversations and a user-friendly interface, A.P. Singh et al. suggested a differential diagnosis list rather than a diagnosis, whereby prevention should be the main discussion online. The HBCS supports the idea of disseminating medical awareness and knowledge online to better understand diseases or health problems at one's fingertips, in promoting better preventions and precautions. It helps to propose certain levels of diagnosis and treatment plans suggested by medical experts. Unless the symptoms and diseases are comprehendible and not serious, a medical practitioner would advise to seek for an appointment immediately, or sort out an urgent appointment if possible. The medical practitioner will keep the summary of the predicted progress and diagnosis. They must establish whether or not the patient needs immediate attention. Even if the patient is progressing well, the medical practitioner should reconsider the diagnosis. If the patient has deviated from the predicted path, the diagnosis must be reassessed, as well as if the treatment plan has been continued. Revising a diagnosis requires a significant psychological effort, and the HBCS must work with medical experts in providing sufficient, high level of medical reasonings and suggestions.
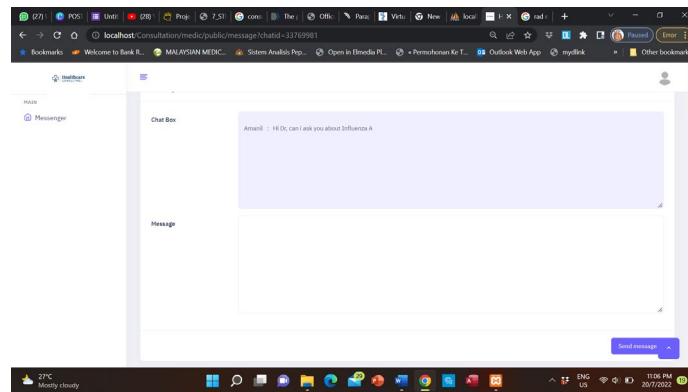

Figure 3: HBCS Consultation (Patient's Query)

2. Materials and Methods

The research was carried out using the Rapid Application Development (RAD) technique. RAD is an adaptable software development technique that uses prototyping to obtain requirements for application systems. Despite the fact that the software development approach is always evolving, RAD is still relevant and frequently utilised by software developments. It is divided into four major phases, namely are requirements planning, user design, construction, and cutover.

The requirements planning process includes obtaining the requirements for a web-based application. Unified Modelling Language (UML) diagrams such as use case, activity, and class diagrams are used to express and document all the requirements. The UML is suggested as the most widely used modelling language on model-based software development [4]. During the concurrent user design and building phases, the system's user interface is constructed; this involves prototyping, testing and refining the system. One advantage is the developer can make improvements to the project without having to develop from scratch [5]. Users provide feedback during the design and development phases to improve the design, interfaces and information flow of the HBCS. The methodology is suggested to provide greater feedback that may help in improving customers' satisfaction [6]. Finally, during the cutover process, a usability test is performed on the system. The design and development of HBCS cater the requirements planning, user design, and construction stages, while the evaluation and analysis of HBCS comprehend the cutover phase.

3. Results and Discussion

The following discussion outlines the evaluation settings, information on respondents' demographic, results on HBCS usability that evaluate the interfaces, usefulness as well as user satisfaction.

3.1 The Evaluation Setting

A usability evaluation was done on 32 respondents that include students, member of staff and others. Respondents were approached in campus and they agreed to participate in the survey. The HBCS and the Google Forms questionnaire were utilized for the evaluation. The questionnaire is divided into three sections and contains 16 questions. Section A requested demographic information from respondents, while Section B requested a four-point Likert scale review of the user interface. Section C inquired about user satisfaction on the system. All respondents followed the steps outlined below: (1) read and sign a consent form, (2) utilize and test the system, and (3) answer the questionnaire.

3.2 The Respondents' Demographic

Respondents' demographic information revealed that 66.7% of the repondents are students, 30.3% of them are others and 3% of them are staff members whereby 56.3% of them are male and 43.8% are female. **Figure 4** shows that 48.5% of the respondents are Malay, 30.3% are Chinese and 21.2% of them are Indian. **Figure 5** shows that 69.7% respondents belongs to the age of 21-25 years old, 18.2% falls in the range of 26-35 years old and 12.1% in the range of other groups of ages.
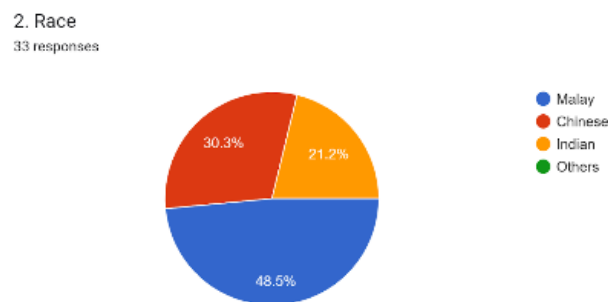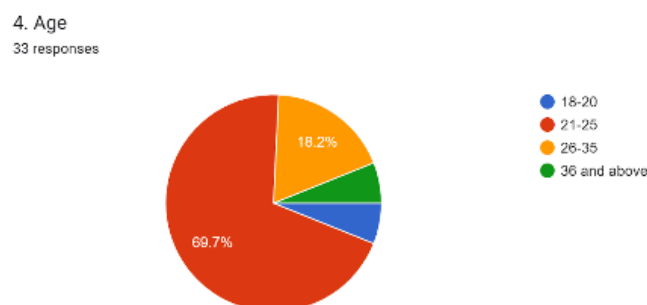

Figure 4: Race of respondents

Figure 5: Age of respondents

3.3 User Interface Evaluation of HBCS

The replies of respondents in Section B of the questionnaire were analyzed. This section assesses respondents' attitudes regarding the Health and Wellbeing Consultation System (HBCS) interfaces. It also assessed respondents' satisfaction with the HBCS interfaces. **Table 1** illustrates how respondents

rated on three, four and five of the questionnaire scales. None of the respondents rated one or two. There are questions that asked respondents about the usefulness of the system and one of the findings demonstrate that all respondents agree to "Do you find HBCS useful?" in which 100% of the respondents opted yes. This is shown in **Figure 6**.

Table 1: Usability Results on User Interface

Questionnaire Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Do you think HBCS overall looks good?			10 (30.3%)	15 (45.5%)	8 (24.2%)
Do you find the HBCS user-friendly?			12 (36.4%)	17 (51.5%)	4 (12.1%)
Do you think HBCS fulfils your needs?			13 (39.4%)	17 (51.5%)	3 (9.1%)
Do you think the HBCS makes easier for you to consult on health with medical practitioner?			10 (31.3%)	16 (50%)	6 (18.8%)

9. Do you find HBCS useful?
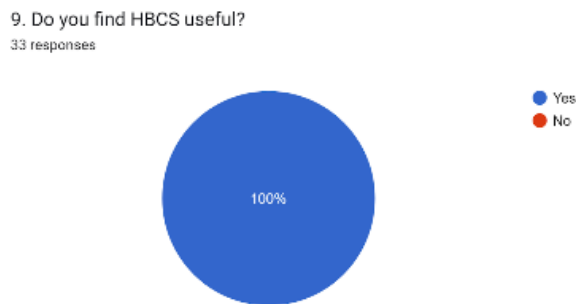33 responses

Figure 6: Usability Results on HBCS Usefulness

D. User Satisfaction

An analysis was conducted on the respondents' responses in Section C of the questionnaire. This section measured the respondents' satisfaction towards the HBCS. **Table 2** shows that respondents rated three, four and five of the questionnaire scales for satisfaction. None of the respondents rated one and two. On this satisfaction part, results demonstrate that 11 respondents (34.4%) choosed neutral, 15 respondents (46.9%) choosed agree and 6 respondents (18.8%) choose strongly agree to the question of "are you feeling satisfied with this system?". **Figure 7** visualizes satisfaction responses from the respondents.

Table 2: Usability Results on User Satisfaction

Questionnaire Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Are you feeling satisfied with this system?			11 (34.4%)	15 (46.9%)	6 (18.8%)

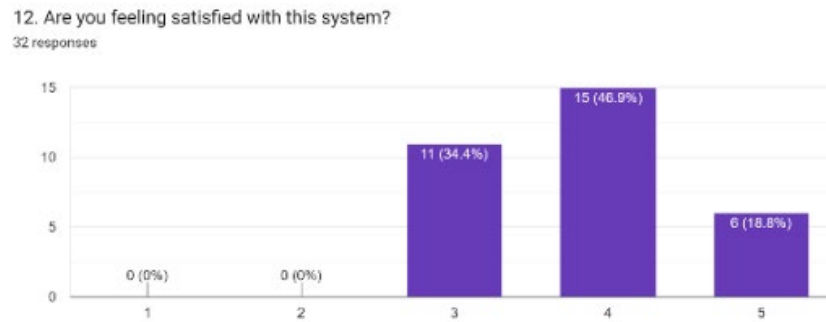12. Are you feeling satisfied with this system?
32 responses

Figure 7: Usability Results on User Satisfaction

4. Conclusion

This paper describes the design and development the HBCS in promoting flexibility in managing disease and medical appointment. Users get to seek for consultations and medical advises from medical practitioners in a quick and flexible manner. The HBCS provides flexibility and saves up time as users can get to access the system at ease using their own devices. This work aims to ease the process of obtaining right and crucial information about diseases and relevant treatments without having to attend to clinics or hospitals physically in the first place when seeking for immediate medical advises. Since Covid-19 cases are still in concerns, people prefer to use online platforms to avoid meeting people in physical to lessen the rate of infection of any diseases. The use of the Internet has increased as most of us learned how to work in different circumstances to make a living. This system serves the need of helping others in need of medical support, awareness and advises more quickly. It helps in disseminating the right information in consulting or obtaining crucial information about diseases, essential treatments as well as provides flexibility in booking medical appointments at our fingertips. The usability evaluation results demonstrate that the EPSS received various reviews from the respondents, whereby most of them perceived the system with good reviews such as having good, pleasant appearance through usable interfaces, being user-friendly and easy to use, other than fulfills users' requirements and works as expected.

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