UTM UNIVERSITI TEKNOLOGI MALAYSIA

FACULTY OF COMPUTING
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Project: Phase 1

Pulse+

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Section: 08

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1.0 Introduction

Traditional Chinese medicine (TCM) has evolved over thousands of years. TCM practitioners use various psychological and/or physical approaches (such as acupuncture and tai chi) as well as herbal products to address health problems. (*Traditional Chinese Medicine: What You Need to Know*, n.d.)

In short, a Chinese Medicine Clinic is a healthcare facility that specializes in traditional Chinese medicine (TCM), an ancient system of healing that has been practiced for thousands of years. TCM encompasses a holistic approach to healthcare, focusing on the balance of energy, or "qi," within the body to promote overall well-being. These clinics often offer a range of treatments, including acupuncture, herbal medicine, cupping therapy, and dietary advice, all tailored to address the individual needs of patients.

Despite the rich history and effectiveness of Chinese medicine, many clinics still rely on traditional paper-based methods for recording patient information. This is because many of the TCM are owned by the older generation that don't really know much about technology. For example, our client, Fook Onn Hoe, a Traditional Chinese Medicine Clinic located in Perak which was established in 1948 also using the paper-based method. While this approach may have served its purpose in the past, it comes with inherent weaknesses that can impede the efficiency and quality of patient care. With this, our group proposes to improve the key in the record system using technology by creating a system name Pulse+ and database that allow the client side to input and access detailed patient data including health history, symptoms, tongue and pulse analyses, diagnoses, acupuncture points used, herbal formulas prescribed, and treatment outcomes. All information will be stored in a centralized database.

2.0 Background Study

Traditional Chinese medicine (TCM) has a long history dating back thousands of years. It is still quite popular in Malaysia especially among the older Chinese generation because of the holistics approach of TCM, low side effects and personalized treatment.

However, if we compare TCM with mainstream medicine, most TCM clinics continue to use paper-based medical records to document patient consultations. One of the main reasons would be most of the TCM are owned by the older generation that have no clue about technology, but now more and more TCM clinics are inherited to the second generation where they could bring in changes by using technology especially in keeping the patients information and medical records. There are many limitations in using paper-based medical records to document patient consultations which include:

- Inefficient retrieval of patient history - Doctors or practitioners must flip through paper folders to review past visit notes and treatments. Important information can be missed.

- Risk of lost records - Paper can be misplaced or damaged. No backup exists.

- No standardization - Handwritten notes may be incomplete or inconsistent between practitioners.

Many studies have shown that digital systems like electronic health records (EHRs) can help overcome these challenges and improve quality of care. EHR systems have been widely adopted by mainstream medicine.

Therefore, this project aims to implement an EHR system tailored to TCM workflows to bring the benefits of digitization to TCM clinics. The system will allow practitioners to better record, store, retrieve, analyze, and share patient data to enhance diagnosis and treatment. This can lead to improved patient outcomes.

3.0 Problem Statement

One of the biggest obstacles to providing effective, safe, and integrated healthcare in the context of Chinese Medicine Clinics is the continued use of paper-based record-keeping systems. Because of these drawbacks, maintaining paper records in the traditional manner slows down workflow and lowers the standard of patient care. With an emphasis on the pressing need to switch to electronic health record (EHR) systems, this problem statement aims to highlight the main problems that arise from the use of paper records in the context of Chinese medicine clinics.

1. Inefficient Information Retrieval:
Searching through paper records for specific patient information can be time-consuming and error-prone. Electronic systems offer advanced search functionalities, allowing practitioners to quickly retrieve and review relevant patient data. This efficiency is crucial for making timely and informed healthcare decisions.

2. Limited Accessibility and Coordination:
Paper records are often physically stored, making them susceptible to misplacement or damage. This can result in delays in accessing patient information when needed, especially in urgent situations. Additionally, if multiple practitioners are involved in a patient's care, coordinating and sharing paper records can be challenging, leading to inefficiencies and potential errors.

3. Scalability Challenges:
As the volume of patient data increases, paper-based systems face scalability challenges, leading to difficulties in storage and organization. Electronic health records provide a scalable solution, accommodating the growing amount of patient information efficiently.

4. Version Control Issues:
Paper records are static and prone to manual errors or outdated information. When updates or changes are made, maintaining version control becomes challenging. Electronic health records

allow for real-time updates and ensure that practitioners are accessing the most current and accurate patient information.

5. Limited Data Analysis and Trend Identification:
Paper records make it challenging to analyze patient data systematically over time. Electronic health records enable Chinese medicine practitioners to identify patterns, trends, and correlations in patient information. This analytical capability can lead to more informed treatment decisions and better patient outcomes. For example, by using paper we cannot paste the picture of the patient's condition on time, but by using the electronic health record, the doctors can take the picture for the patient's condition and upload it fastly.

The outlined issues underscore the urgent need for Chinese Medicine Clinics to transition from paper-based record-keeping systems to modern electronic health record solutions. This shift is essential for improving efficiency, ensuring data security, promoting collaboration among healthcare providers, and ultimately enhancing the quality of care delivered to patients in the realm of traditional Chinese medicine. Addressing these challenges requires a strategic and timely adoption of technology to bring Chinese Medicine Clinics in line with contemporary healthcare practices.

4.0 Proposed Solutions (include feasibility study)

To address the identified challenges associated with paper-based record-keeping in Chinese Medicine Clinics, the proposed solution involves the strategic adoption of Electronic Health Records (EHRs) and create our own system which is Pluse+. EHRs are digital versions of patients' paper charts, containing comprehensive and up-to-date information that can be securely accessed by authorized healthcare providers. The transition to EHRs presents a holistic solution to enhance efficiency, data security, collaboration, and overall patient care in Chinese Medicine Clinics.

Feasibility of the Proposed Solution:

1. Financial Feasibility:
Cost-Benefit Analysis:
Conduct a thorough cost-benefit analysis to evaluate the financial implications of transitioning to EHRs. Consider initial implementation costs, ongoing maintenance expenses, and potential long-term savings resulting from increased efficiency and reduced administrative overhead.

2. Technical Feasibility:
Infrastructure Assessment:
Evaluate the existing technological infrastructure of the Chinese Medicine Clinic. Ensure that it can support the implementation and maintenance of an EHR system, including considerations for hardware, software, and network requirements. In our interview session with our clients, we know that they have the problem about too many papers that need to be stored and also it’s hectic for them to store those papers.

3. Operational Feasibility:
Workflow Integration:
Analyze current clinic workflows and design the EHR system to seamlessly integrate with existing processes. Minimize disruptions to daily operations during the transition.

User Training:

Develop a comprehensive training program for healthcare professionals to ensure a smooth transition to the new EHR system. This includes training on data entry, retrieval, and security protocols. This can make sure our clients which are not familiar with this technology can use this system efficiently in the real time.

4. Scalability:

Future Growth Considerations:

Design the EHR system with scalability in mind, accommodating the growth of patient data and the potential expansion of the clinic. Ensure that the system can adapt to evolving technological requirements. Since our record is online recording, we need to have a large memory space in the cloud to store the data.

Vendor Support:

Choose a reputable EHR vendor that provides ongoing support and updates to meet the changing needs of the clinic.

5. Change Management:

Stakeholder Engagement:

Involve key stakeholders, including healthcare providers, administrative staff, and IT personnel, in the decision-making process. Address concerns and provide a clear communication plan to manage the change effectively.

5.0 Objectives

For solving client's problem or simplify clients' burdens, below is the target for our project:

-To provide a system that able to record the patient's record electronically
-To help the doctor key in every patient's condition by picture and video if needed
-To help the doctor have a reference with the patients that have the same condition quickly
-To analysis the patient's condition easily and fastly

6.0 Scope

6.1 Major User View

In this system, the main users would be doctors, receptionists and clinic managers. Unfortunately, we will not include the patient as one of the users in the system as it may get complicated for now since we are proposing this system from scratch and we do not want the system to get too complicated. This system will mainly allow users to perform the basic CRUD on the patient info, appointments, inventory management and probably billing.

For the doctors:
The doctors will be the one using the system heavily during patient visits to record health history, conduct assessments, document treatment details, prescribe formulas, order tests, and review past records. They are also allowed to view how many appointments they have for the day or the week so they are able to plan their job better. They are able to record treatment plans and advice given to the patient and also generate reports on patients and clinic activities.

For the receptionists:
Receptionists will rely on the system at the front desk to manage appointments, patient check-ins, insurance, and billing. They need to schedule appointments optimized for doctors availability. Since the patients are not part of the user of the system, hence we will integrate Whatsapp API or some other communication applications API to allow the receptionists to contact the patient to remind them about their appointment. On the other hand, they will also be in charge of the payment and billing.

For the clinic managers:
Clinic managers oversee the administration of the system with capabilities like user management, access control, system settings, terminology configuration, billing rules, clinic performance reporting, and IT operations like backups. Managing users, security policies, system configuration, and analytics are key requirements.

6.2 System boundaries

In Scope:

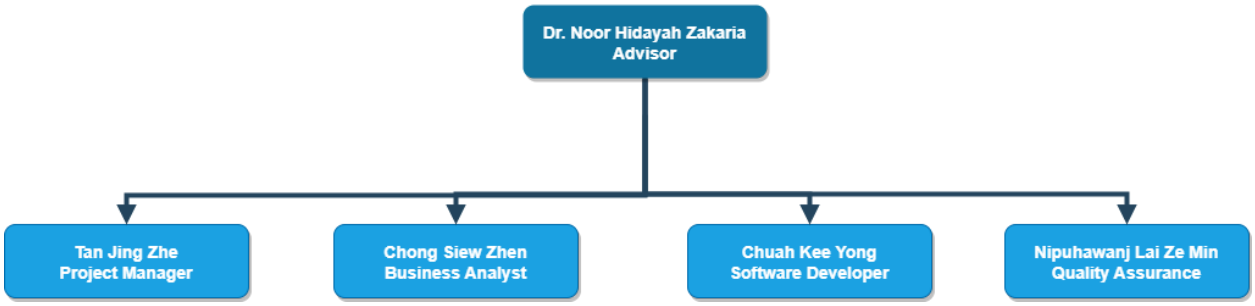
- Patient details and contact info
- Health history, allergies, medications
- Record and diagnosis per visit
- Clinical notes, tongue/pulse analysis
- Lab tests, imaging orders and results
- Treatment details like acupuncture, herbal formulas
- Appointment for patients
- Inventory management for herbs and medicine
- Billing information and insurance claims

Out of Scope:

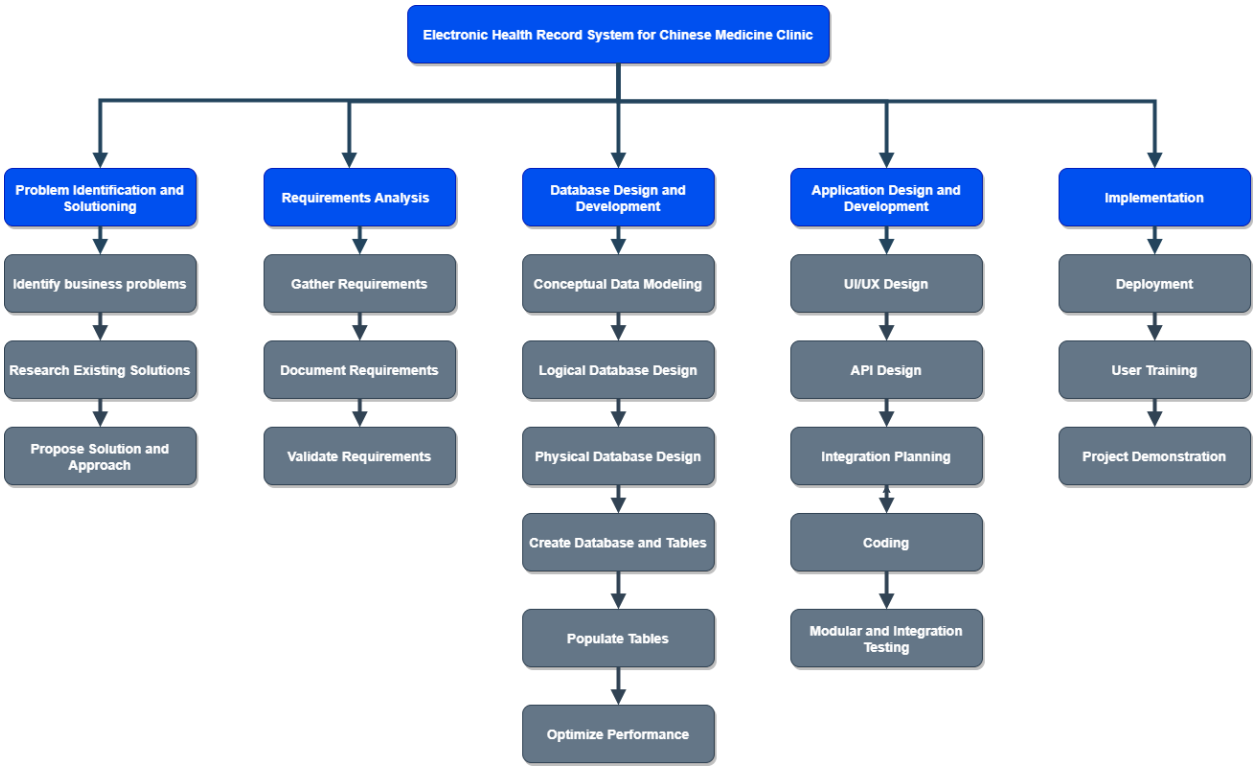
- No medical device integration
- No imaging or lab system integration
- No access from external networks
- No patient health tracking devices integration
- No telepharmacy features for patients to call
- No online patient consultation

7.0 Project Planning

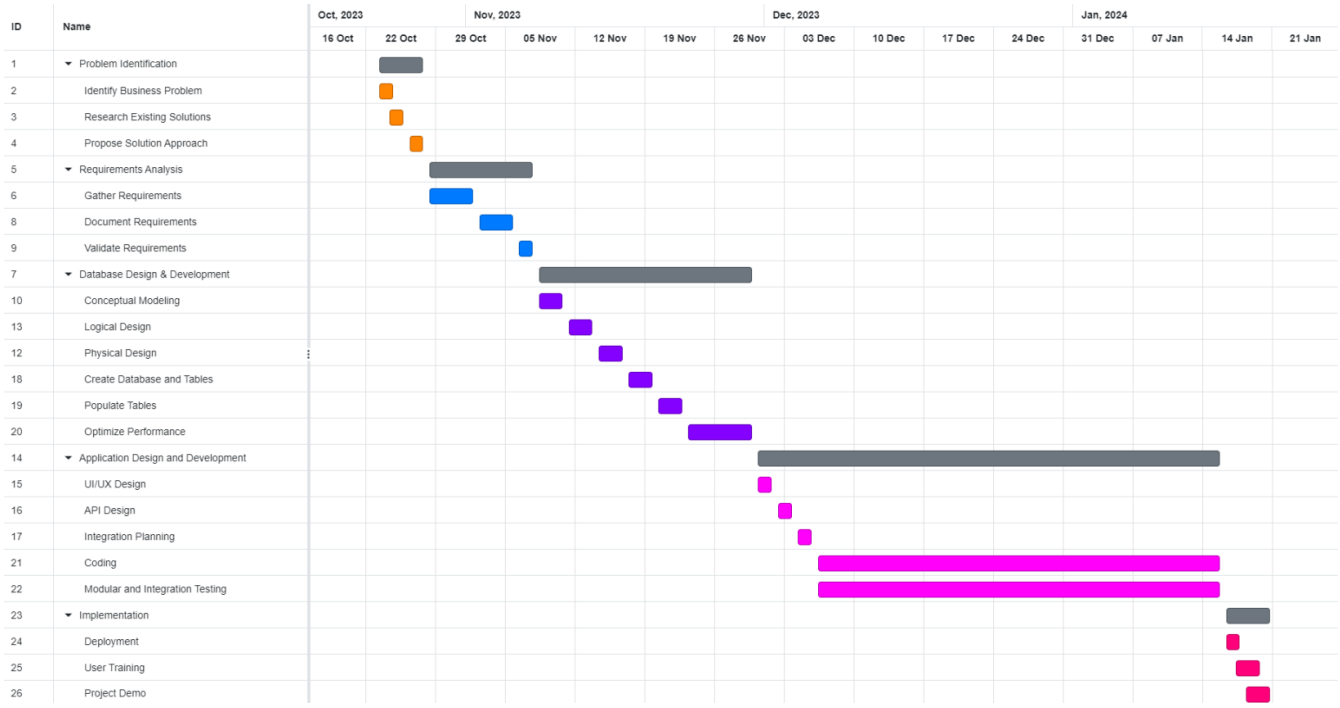
7.1 Human Resource



7.2 Work Breakdown Structure (WBS)



7.3 Gantt Chart



8.0 Requirement Analysis (based from AS-IS analysis)

8.1 Current business process (scenarios, workflow)

For the Traditional Chinese medicine clinic, the current business processes and routines are all done by hand and on paper. It is very inefficient and takes a lot of time. The receptionists use the paper appointment booking system to schedule appointments and check in patients, which makes managing appointments difficult.

1. Appointment Scheduling and Check-In
    - The doctors and nurses have to write down the appointments in a book while the customers would like to book appointments. The paper-based appointment booking and check-in system is very inefficient and makes managing appointments difficult and not systematic.
2. Patient Consultations and Record Keeping
    - Doctors have to write the patient's background, assessments, treatment details and any other details by hand in a physical file. This leads to the difficulty in information searching.
    - As a result, when the doctor would like to find a specific file, it is difficult for them to find the records although they already sort it following alphabetical order.
    - The referrals also require manually coordinating paper records over the phone, it slows the process down.
3. Inventory Management
    - The herbs and materials inventory is done and sorted by hand in ledgers rather than a real-time digital system to track everything. It is very wasted time to manage the inventory
4. Billing and Payments
    - Paper-based bills and payment records are still handled at the counter. It is difficult to manage these records and store them.
    - Insurance claims also require a lots of manual paperwork.

5. Reporting and Analysis
    - For the calculation of any report, the doctors still need to calculate it manually. It limits the ability to analyze data and visualize the data.
6. Patient Engagement
    - There is no patient portal for patients to view their health data.
    - If they want to view any details, they have to go to the clinic again to take the report.
    - It is difficult to take an active role in their care and treatment also.

9.0 Transaction requirement (data entry, data update/delete, data queries)

The system should support the following key transaction types:

9.1 Data Entry

- Enter new patient registration details
- Record patient visit details like symptoms, pulse/tongue analysis etc.
- Prescribe herbal formulas and treatments
- Place orders for medicines and materials
- Schedule appointments and inform patients through WhatsApp
- Enter billing and insurance information

9.2 Data Update

- Update patient demographics and contact information
- Update patient health/visit details during follow up consultations
- Update appointment details
- Update order statuses
- Update billing information

9.3 Data Delete

- Soft delete patient records for former patients
- Cancel appointments
- Cancel orders

9.4 Data Queries

- Search patients by name, phone, date of birth etc.
- Retrieve patient visit history and treatment details
- Get list of appointments for a day/week
- Check medicine inventory levels
- View clinic revenue/expense reports

- View practitioner performance reports

Key non-functional requirements:

- Data should be well-validated and sanitized
- Transactions must maintain data integrity
- The system must be responsive for seamless workflows
- Transactions should follow ACID properties

10.0 Benefit and Summary of Proposed System

The Fook Onn Hoe plans to implement an Electronic Health Record (EHR) system that will overcome the drawbacks of paper-based records. Thus, we do the system by the name Pulse+. This system will use modern technology to improve the clinic's efficiency, data security, and patient care. The system will have a user-friendly interface with features such as fast information retrieval, searching machine, and advanced analytics. These features will help the practitioners provide more effective and integrated healthcare services. The following are the benefits of the proposed Pulse+ system:

Benefit 1: Efficient Electronic Record Keeping

By transitioning from paper-based records to an electronic system, the clinic can streamline the patient record management process and reduce the administrative burdens associated with manual data entry, storage, and retrieval. The electronic system will also enhance the overall efficiency of the clinic by allowing faster access to patient information, reducing errors and duplication, and facilitating data backup and recovery.

Benefit 2: Multimedia Documentation for Enhanced Understanding

The electronic system will empower healthcare professionals to document patient conditions using pictures and videos, in addition to text and audio. This will provide a richer and more detailed representation of each case, enhancing the understanding of the patient's situation and history. Multimedia documentation will also enable better communication and collaboration among healthcare providers, as they can share and view the images and videos easily and securely.

Benefit 3: Rapid Patient Condition Comparison

The electronic system will implement a searching machine that will enable quick and easy comparisons of patient conditions, based on various criteria such as symptoms, diagnosis, treatment, and outcome. This will allow doctors to identify similarities and differences among patients swiftly, leading to more effective decision-making and improved patient care. The

searching machine will also help doctors to find relevant cases and references from the clinic's database and external sources, enhancing their knowledge and skills.

Benefit 4: Swift Data Analysis for Informed Decision-Making

The electronic system will integrate advanced analytics tools that will expedite the analysis of patient data, using various methods such as statistics, graphs, and charts. This will allow healthcare practitioners to identify trends and patterns in patient data promptly, leading to more informed and timely decisions. The analytics tools will also help practitioners to monitor and evaluate the effectiveness of their interventions, as well as to identify areas for improvement and innovation.

11.0 Summary

The continued reliance on paper-based record-keeping systems in Chinese Medicine Clinics poses substantial obstacles to the delivery of effective, safe, and integrated healthcare. This Pulse+ system is able to address key issues, including inefficient information retrieval, limited accessibility, scalability challenges, version control issues, and restricted data analysis capabilities.

The urgency of this transition is underscored by the need to improve efficiency, ensure data security, promote collaboration among healthcare providers, and enhance the overall quality of care delivered to patients in the field of traditional Chinese medicine. By adopting EHRs, Chinese Medicine Clinics can overcome these challenges, positioning themselves for long-term success in a rapidly evolving healthcare landscape. The proposed solution not only mitigates immediate concerns but also ensures adaptability and sustainability in the digital era of healthcare practices.

Reference

1. *Traditional Chinese Medicine: What You Need To Know*. (n.d.). NCCIH. https://www.nccih.nih.gov/health/traditional-chinese-medicine-what-you-need-to-know