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UNIVERSITI TEKNOLOGI MALAYSIA

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UTM Johor Bahru

## **SECD 2523 –DATABASE**

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### **PHASE 2:**

### **CareConnect System**

SECTION: 08-SECJH

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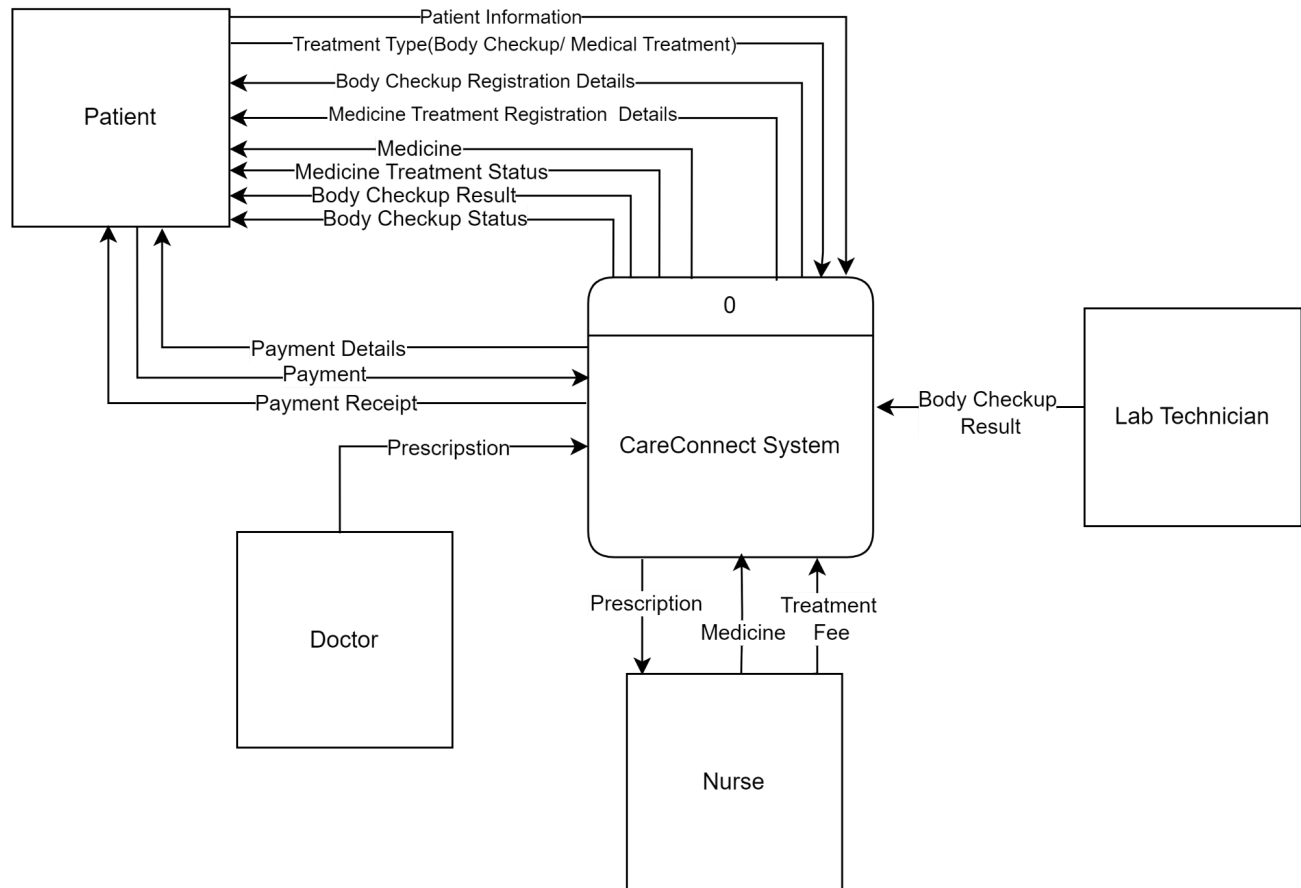
## **1.0 Introduction**

In this project, the CareConnect system is developed to enhance the efficiency of the PUSAT KESIHATAN UNIVERSITY (PKU) at UTM. This system aims to address the existing challenges which are faced by our stakeholder in patient registration management, test status tracking and financial transaction. Therefore, this phase 2 of the project is created to explain our system in more detail and understand.

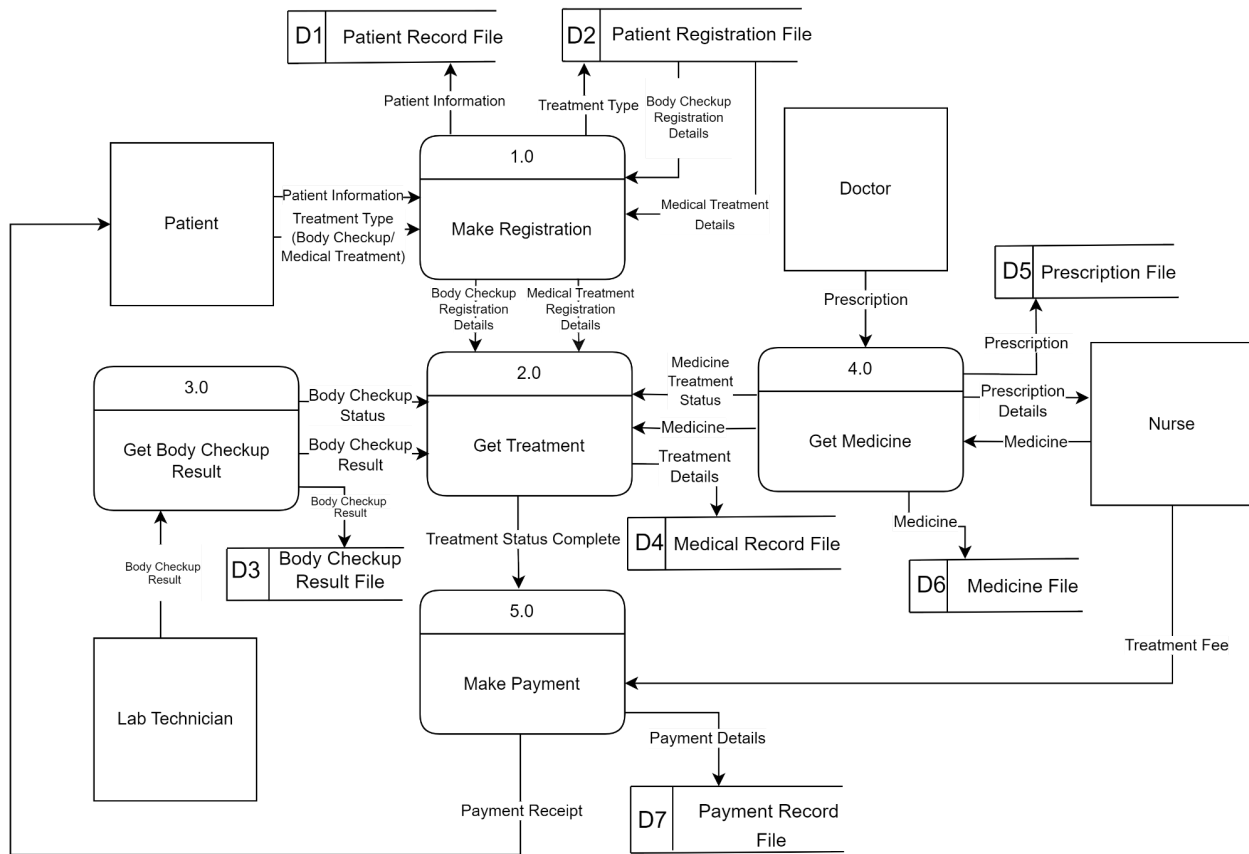
Firstly, the proposed changes in the system are being discussed through the to-be Data Flow Diagram (DFD). This is to let the stakeholder easily and clear the details of the system. Next, the proposed data and transactional requirements are outlined for better and smooth operation. The proposed business rule also is being discussed in this section. After that, the database conceptual designs are illustrated by Conceptual Entity-Relationship Diagram (ERD) and Enhanced ERD (EERD). This is to give a visual understanding of the system's structure. Other than that, a data dictionary is also shown to provide detailed and more understanding descriptions of key elements which are entities, relationships and attributes. In short, this phase 2 project provides user-friendly healthcare management that can fulfill the requirements of both patients and staff at PKU.

## 2.0 DFD (To-Be)

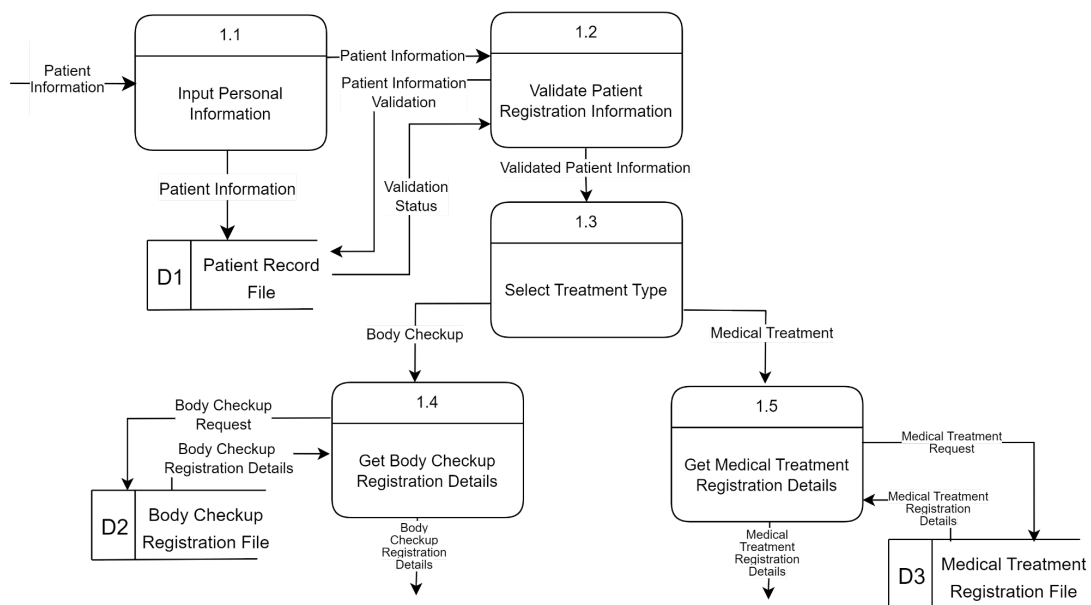
### 2.1 Context Diagram



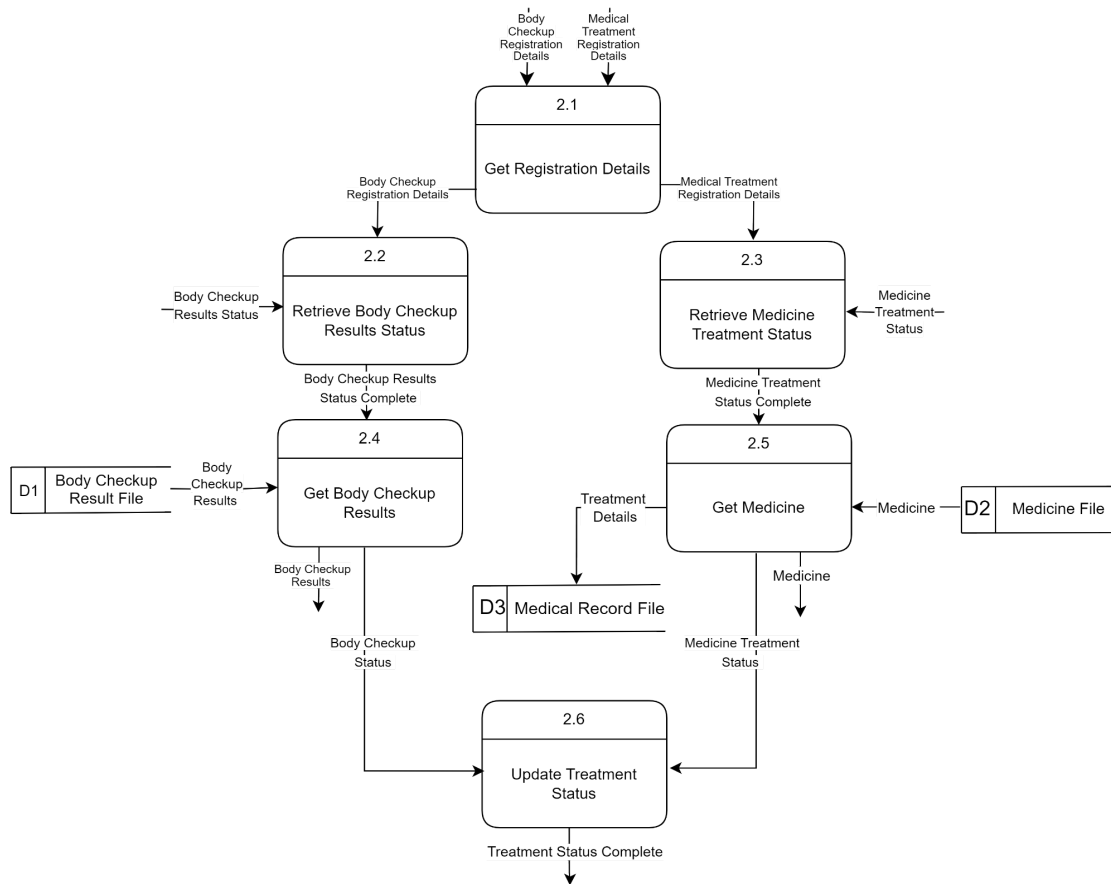
## 2.2 Parent Diagram DFD Level-0



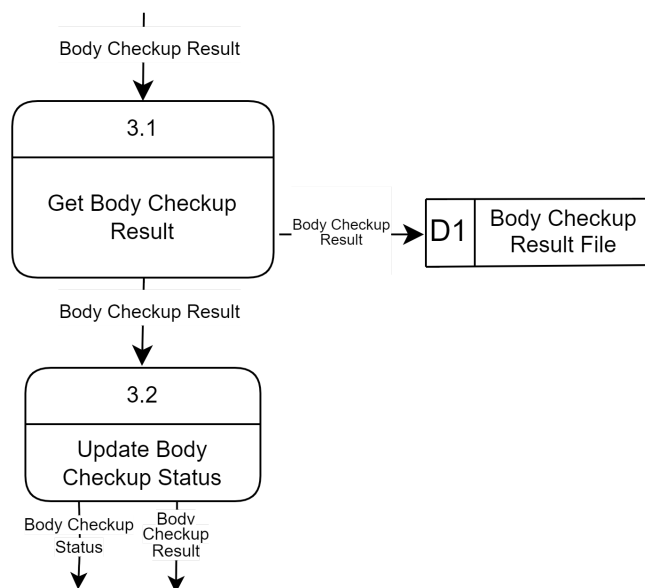
### 2.2.1 Child Diagram DFD Level-1 For Process 1: <Make Registration>



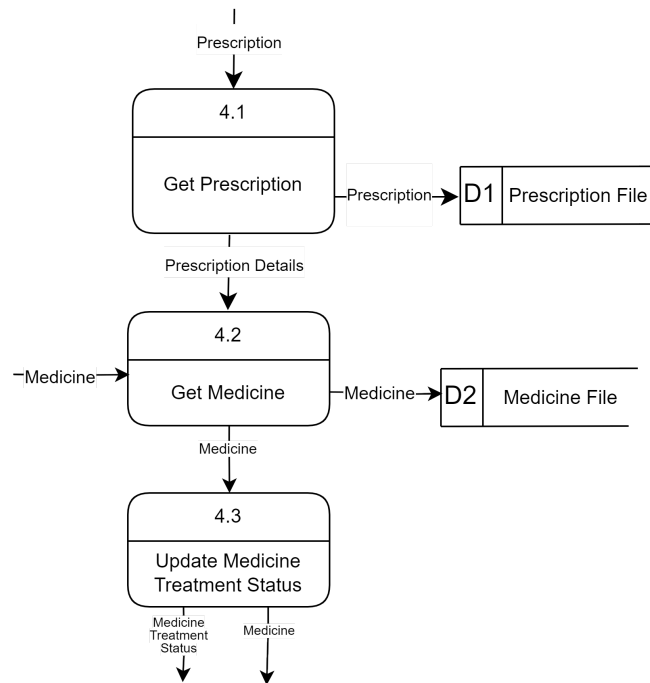
## 2.2.2 Child Diagram DFD Level-1 For Process 2: <Get Treatment>



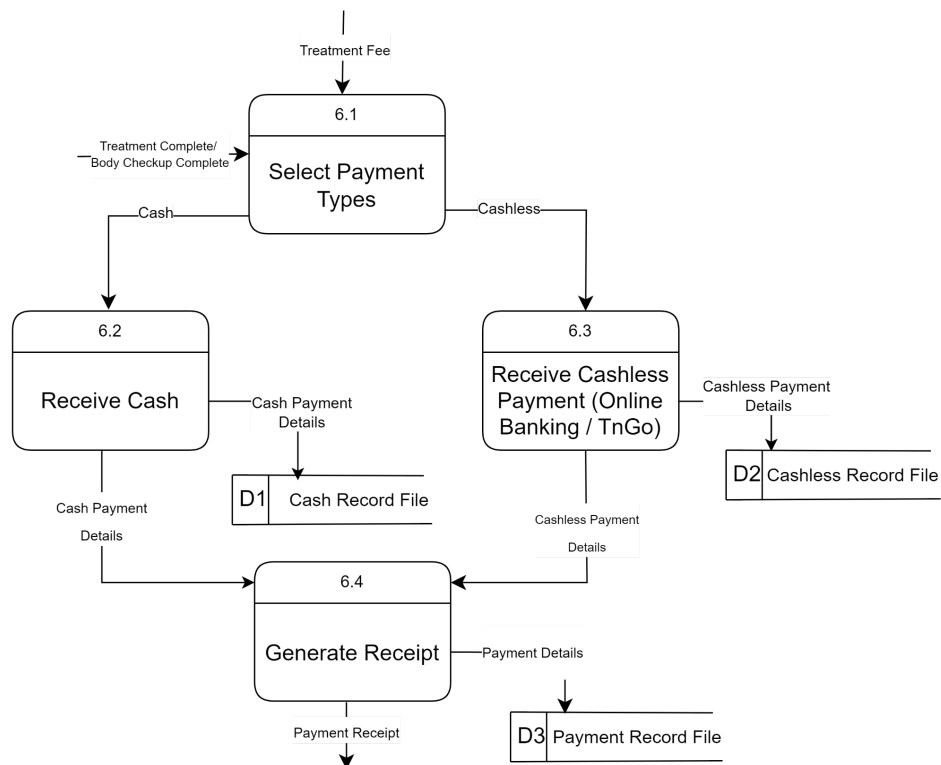
## 2.2.3 Child Diagram DFD Level-1 For Process 3: <Get Body Checkup Result>



### 2.2.4 Child Diagram DFD Level-1 For Process 4: <Get Medicine>



### 2.2.5 Child Diagram DFD Level-1 For Process 5: <Make Payment>



### **3.0 Data & Transaction requirement**

#### **3.1 Proposed business rule**

1. The system is working during PKU's operating hours which are 8:00 am to 5:00 pm everyday (9 hours).
2. There are no patients who can visit or make treatment outside these hours.
3. Patients can be UTM students or outsiders.
4. Patients must log in or register an account before making a treatment.
5. Patients can make only one treatment each time.
6. Only authorized staff can update the test status of a patient.
7. Updates to test status must occur within 3 hours of the test being conducted to ensure timely and accurate information.
8. Patients can make payment through cash or cashless methods.
9. Patients can only choose one payment method which is cash or cashless.
10. The payment system will generate a receipt immediately after customers complete cash payment.
11. The payment status will be updated in 5 minutes while the customers are fully paid by cashless method.
12. Only authorized staff can update and delete patient's treatment information within 24 hours of receiving the test results of patients.



### **3.2 Proposed data & transactional**

#### **Proposed data**

##### **Branch**

The data stored on Branch includes branch ID, telephone number and address. The address is a composite attribute because it consists of street, city and postcode. The Branch ID is the unique primary key in this entity. One branch employs at least one doctor.

##### **Doctor**

The data stored on a doctor entity includes doctor ID, name, date of birth (DOB), gender, address, salary, phone number, qualification and specialisation. The name and the address are composite attributes. The name consists of first name and last name. The address attribute consists of street, city and postcode. The doctor ID is the unique primary key. One doctor can treat many patients and one doctor can give many prescriptions. Besides, one doctor is employed by one branch only.

##### **Patient**

The data stored on a patient entity includes patient ID, name, date of birth (DOB), gender, address, and phone number. The name and the address are composite attributes. The name consists of first name and last name. The address attribute consists of street, city and postcode. The patient ID is the unique primary key. One patient can just only make one registration and One patient can just only make one payment. Besides, one patient can take a lot of medicine. Moreover, one patient is treated by one doctor only.

##### **Medical Staff**

The data stored on a staff entity includes staff ID, name, date of birth (DOB), gender, address, salary, phone number, qualification, specialisation, medicine ID and invoice number. The name and the address are composite attributes. The name consists of first name and last name. The address attribute consists of street, city and postcode. The staff ID is the unique primary key of this entity. The medicine ID and the invoice number are the foreign key which references the medicine and payment entities. One medical staff can manage one or many medicines. Besides, one medical staff can manage many payments.

### **Registration**

The data stored on a registration entity includes registration number, queue number, room number, date, time and patient ID. The registration number is the unique primary key. The patient ID is the foreign key which references the patient entity. One registration can only be made by one patient.

### **Prescription**

The data stored on a prescription entity includes prescription ID, date, patient ID and doctor ID. The prescription ID is the unique primary key. The patient ID and the doctor ID are the foreign key which references the patient and doctor entities. One prescription can be given by one doctor only. Moreover, one prescription can have many medicines.

### **Medicine**

The data stored on a medicine entity includes medicine ID, medicine name, price, quantity and prescription ID. The medicine ID is the unique primary key. The prescription ID is the foreign key which references the prescription entity. One medicine can only have one prescription. Other than that, one medicine can be taken by zero or many patients. One medicine can be managed by one or many medical staff.

### **Payment**

The data stored on a payment entity includes invoice number, date and total amount. The invoice number is the unique primary key. One payment can only be made by one patient. One payment is managed by one medical staff only.

## **Proposed Transactional**

### Data Entry

- Enter patient registration information
- Enter patient admission details include data and time
- Enter details of physical examination tests
- Enter medical information
- Enter billing and payment data

### Data Update/Delete

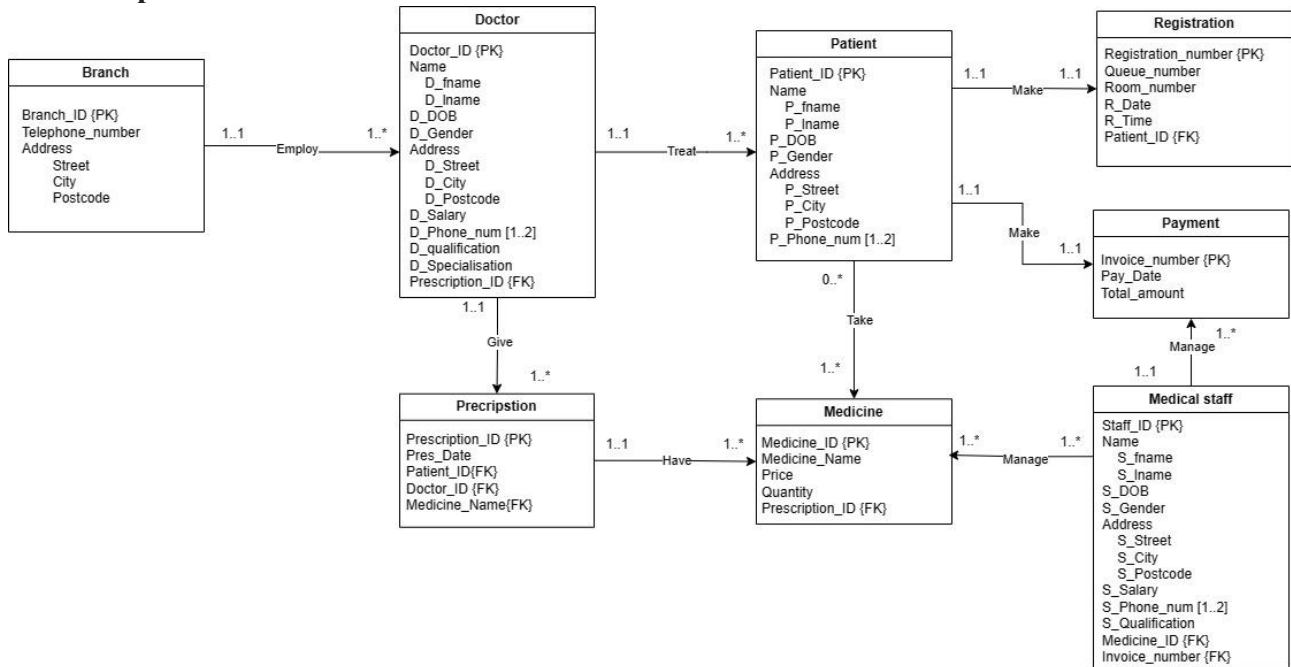
- Update/ delete patient registration information
- Update/ delete patient admission details include data and time
- Update/ delete details of physical examination tests
- Update/ delete medical information
- Update/ delete billing and payment data

### Data Queries

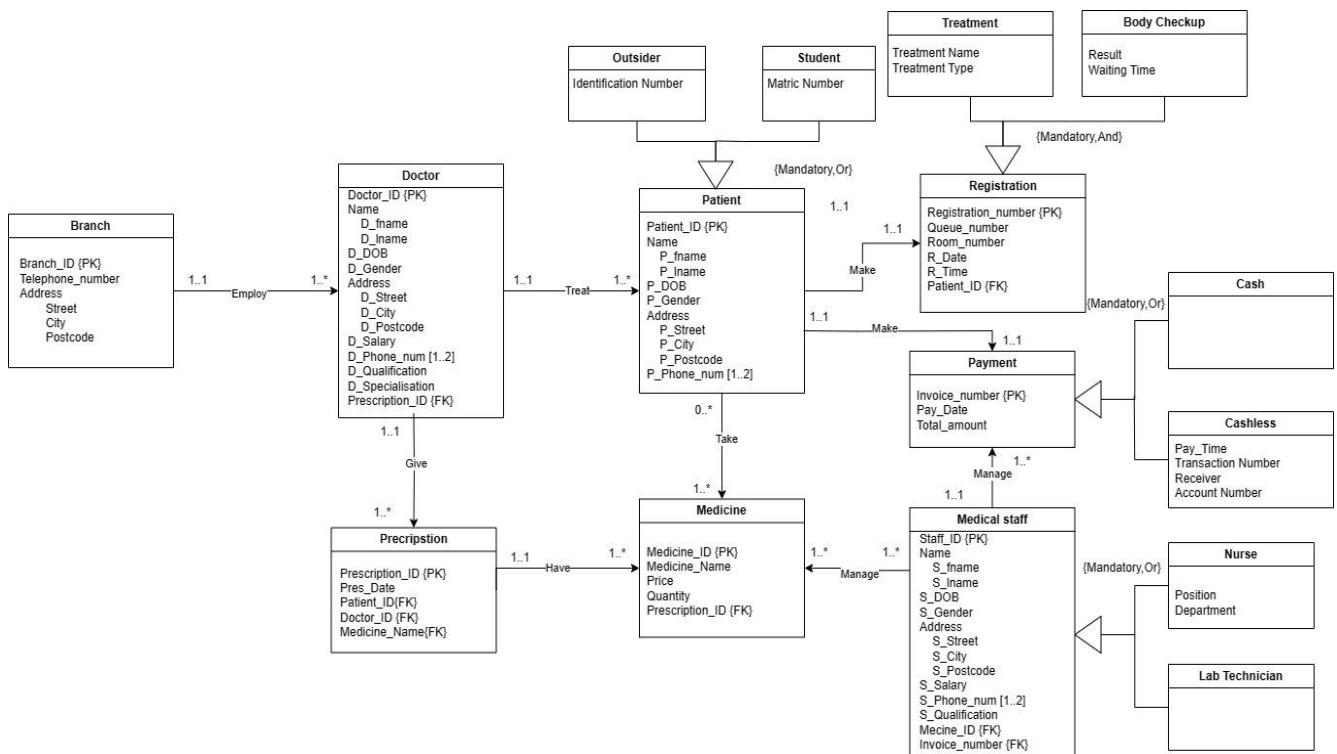
- Identify details of users
- List details of treatments
- Identify the registration number
- Identify medical history
- List medical history
- Identify the online tracking status
- Identify payment status

## 4.0 Database conceptual design

### 4.1 Conceptual ERD



### 4.2 Enhanced ERD (EERD)



## 5.0 Data Dictionary

### 5.1 Description of Entities

Entity	Description	Occurrence
Branch	Hold the data of the branch of PKU	Patients needs the information of the branch of PKU
Patient	Hold the data of patients	Patients is the users of this system that can make the registration automated
Medical Staff	Hold the data of medical staff	Medical staff will help to manage the payment and stock of medicine
Registration	Hold the data during registration	A registration is made by the patients. In the registration, it will include the type of treatment that patient required.
Doctor	Hold the data of doctor	Patients is treated by the doctor
Medicine	Hold the data of medicine	The prescription given will include type and usage of medicine.
Prescription	Hold the data of prescription	Prescription is given by the doctor and received by the patient.
Payment	Hold the data of payment	Payment is proceed by the patients

## 5.2 Description of Relationship

Entity	Multiplicity	Relationship	Multiplicity	Entity
Branch	1..1	Employ	1..*	Staff
Patient	1..1	Make	1..1	Payment
	1..1	Make	1..1	Registration
	0..*	Take	1..*	Medicine
Doctor	1..1	Treat	1..*	Patient
	1..1	Give	1..*	Prescription
Medical staff	1..1	Manage	1..1	Payment
	1..*	Manage	1..*	Medicine
Prescription	1..1	Have	1..*	Medicine

### 5.3 Description of Attributes

Entity	Attribute	Description	Data Type	Constraint
Branch	Branch_ID	Branch's id	VARCHAR2(15)	PRIMARY KEY
	Telephone_Number	Branch's telephone number	VARCHAR2(12)	NOT NULL
	Street	Branch's street	VARCHAR2(30)	NOT NULL
	City	Branch's city	VARCHAR2(30)	NOT NULL
	Postcode	Branch's postcode	NUMBER(5)	NOT NULL
Doctor	Doctor_ID	Doctor's ID	VARCHAR2(15)	PRIMARY KEY
	D_fname	Doctor's first name	VARCHAR2(30)	NOT NULL
	D_lname	Doctor's last name	VARCHAR2(30)	NOT NULL
	D_DOB	Doctor's date of birth	DATE	NOT NULL
	D_Gender	Doctor's gender	CHAR(1)	NOT NULL
	D_Street	Doctor's address street	VARCHAR2(30)	NOT NULL
	D_City	Doctor's address city	VARCHAR2(30)	NOT NULL
	D_Postcode	Doctor's address postcode	NUMBER(5)	NOT NULL
	D_Salary	Doctor's salary	DECIMAL(10,2)	NOT NULL
	D_Phone_num	Doctor's phone number	VARCHAR2(12)	NOT NULL
	D_Qualification	Doctor's qualification	VARCHAR2(30)	NOT NULL
	D_Specialization	Doctor's specialization	VARCHAR2(30)	NOT NULL

	Prescription_ID	Prescription's ID	VARCHAR2(15)	FOREIGN KEY REFERENCE PRESCRIPTION
Medical staff	Staff_ID	Medical staff's ID	VARCHAR2(15)	PRIMARY KEY
	S_fname	Medical staff's first name	VARCHAR2(30)	NOT NULL
	S_lname	Medical staff's last name	VARCHAR2(30)	NOT NULL
	S_DOB	Medical staff's date of birth	DATE	NOT NULL
	S_Gender	Medical staff's gender	CHAR(1)	NOT NULL
	S_Street	Medical staff's address street	VARCHAR2(30)	NOT NULL
	S_City	Medical staff's address city	VARCHAR2(30)	NOT NULL
	S_Postcode	Medical staff's address postcode	NUMBER(5)	NOT NULL
	S_Salary	Medical staff's salary	DECIMAL(10,2)	NOT NULL
	S_Phone_num	Medical staff's phone number	VARCHAR2(12)	NOT NULL
	S_Qualification	Medical staff's qualification	VARCHAR2(30)	NOT NULL
	Medicine_ID	Medicine's ID	VARCHAR2(15)	FOREIGN KEY REFERENCE MEDICINE
	Invoice_number	Payment's invoice number	VARCHAR2(15)	FOREIGN KEY REFERENCE



				PAYMENT
Patient	Patient_ID	Patient's ID	VARCHAR2(15)	PRIMARY KEY
	P_fname	Patient's first name	VARCHAR2(30)	NOT NULL
	P_lname	Patient's last name	VARCHAR2(30)	NOT NULL
	P_DOB	Patient's date of birth	DATE	NOT NULL
	P_Gender	Patient's gender	CHAR(1)	NOT NULL
	P_Street	Patient's address street	VARCHAR2(30)	NOT NULL
	P_City	Patient's address city	VARCHAR2(30)	NOT NULL
	P_Postcode	Patient's address postcode	NUMBER(5)	NOT NULL
	P_Phone_num	Patient's phone number	VARCHAR2(12)	NOT NULL
Prescription	Prescription_ID	Prescription's ID	VARCHAR2(15)	PRIMARY KEY
	Pres_Date	Prescription's date	DATE	NOT NULL
	Patient_ID	Patient's ID	VARCHAR2(15)	FOREIGN KEY REFERENCE PATIENT
	Doctor_ID	Doctor's ID	VARCHAR2(15)	FOREIGN KEY REFERENCE DOCTOR
	Medicine_Name	Medicine's name	VARCHAR2(30)	FOREIGN KEY REFERENCE MEDICINE
Medicine	Medicine_ID	Medicine's ID	VARCHAR2(15)	PRIMARY KEY

	Medicine_Name	Medicine's name	VARCHAR2(30)	NOT NULL
	Price	Medicine's price	DECIMAL(10,2)	NOT NULL
	Quantity	Medicine's quantity	NUMBER(2)	NOT NULL
	Prescription_ID	Prescription's ID	VARCHAR2(15)	FOREIGN KEY REFERENCE PRESCRIPTION
Registration	Registration_number	Registration's number	VARCHAR2(15)	NOT NULL
	Queue_number	Waiting number for patient	NUMBER (4)	NOT NULL
	Room_number	Room number for treatment	NUMBER (3)	NOT NULL
	R_Date	Registration's date	DATE	NOT NULL
	R_Time	Registration's time	TIME	NOT NULL
	Patient_ID	Patient's ID	VARCHAR2(15)	FOREIGN KEY REFERENCE PATIENT
Payment	Invoice_number	Payment's invoice number	VARCHAR2(15)	PRIMARY KEY
	Pay_Date	Payment's date	DATE	NOT NULL
	Total_Amount	Payment's total amount	DECIMAL(10,2)	NOT NULL

## 6.0 Summary

The proposed CareConnect system is implemented to address the problems faced in the current clinic management system at PKU. The system simplifies patient registration, test result tracking, and transaction process. The patient can access the CareConnect system by scanning the QR code and they are redirected to the registration page. For new outsider patients, they are prompted to enter their personal information for registration. For the students or existing patients they just need to enter their matric number or IC number to get the registration number. After that, they need to select either treatment and body checkup, the system will return the queue number, department and room number that the patient should visit. The doctor will give a prescription including the medicine prepared by the chemist. A patient who completes the body checkup can track the status from the website. The status of the body checkup test will be updated by the doctor.

In phase 2 of the project, we include the To-Be Data Flow Diagram(DFD) to show the suggested system changes. The DFD includes Context Diagram, a Level-0 Parent Diagram, and a Level-1 Child Diagram for important processes in the CareConnect System such as making an appointment, getting treatment, getting a body checkup, a prescription, getting medicine, paying for it, setting the treatment charge, and updating the state of the body checkup. To make sure everything runs smoothly, proposed data and transactional needs are laid out, along with business rules. Conceptual Entity-Relationship Diagram (ERD) and Enhanced Entity-Relationship Diagram (EERD) are used to show the layout and the conceptual database design of the CareConnect system.