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BIOM9450

Medical Informatics

Major Project Report

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BIOM 9450	Medical Informatics
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08-12-2022	Prof Hamid Alinejad-Rokny
Submission Date	*Course Coordinator/Lecturer*

Major Project Report
Assignment Title

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Sixiao Li Ze Nan Peng Gary D Nisarg K	08-12-2022
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Contents

Website user manual

Welcome to the Patient Med Administration website. You will be able to access this tool by either downloading our ZIP file or accessing it through our GitHub link:

https://github.com/Sophia-bhs/BIOM9450_Project.

To access the database, the zID for the ODBC connection should be replaced by the right database. To do this, open the folder in a text editor (e.g., Visual Studio Code). Search for 'odbc_connect' and replace the zID within the brackets. Once set up, the Microsoft Access Database can be accessed by the code and have queries created and executed. A list of five practitioner emails and passwords is shown below for testing login purposes:

Practitioner			
ID	**Name**	**Email**	**Password**
1	Gershom Pozzi	g.pozzi@goodhealth.com	zat-Ter3d
2	Delma Ogden	d.ogden@goodhealth.com	rEcePT!0n
3	Andrea Longstaff	a.longstaff@goodhealth.com	su_nc ()AT
4	Brett Foster	b.foster@goodhealth.com	Roar_+Racing!12cAr
5	Lexie Archer	l.archer@goodhealth.com	BoNJ01_1r

Table 1 Practitioner login table

Please open the *index.php* file to run our code:

- For remote access:
  - Use the link, http://engpwws005/zXXXXXXX$/BIOM9450_Project/index.php,
  - with the zID replaced by the account where the database is stored.
- For local access:
  - Please setup ODBC connection and have the php.ini file configured accordingly. Then open the index.php file with preferred browser.

When opened you will be greeted by our login page, where you will be asked to login.

Practitioner Login

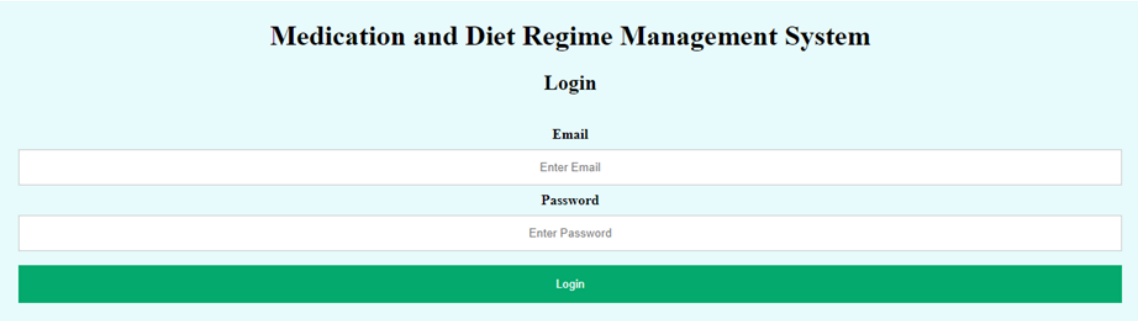


Figure 1. Login page

The practitioner logs into the medication and diet regime management system by entering a valid email and corresponding password (from Practitioner table in the database) via the *index.php* page. *Login.php* checks the validity of the username and password entered by matching the email and password from the database. When the details are entered incorrectly, a pop-up will alert the user that the details entered are incorrect but not specifying which data field for security reasons.

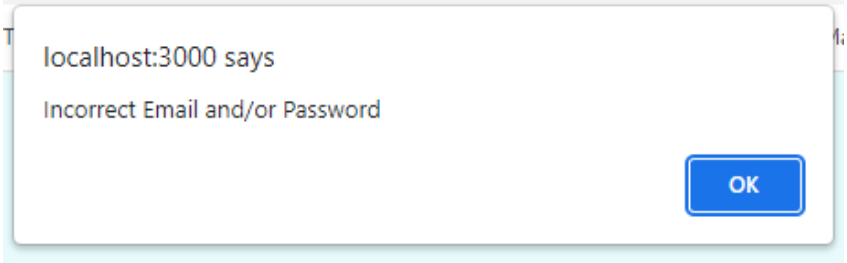


Figure 2. Login error page

If the details are entered correctly, the user will be taken to the home page where they can access all the functions inside the management system.

Home page – Search/browse/edit data

Any of the selected emails and passwords from the practitioner login table above may be used to access the website. Once logged in, the practitioner is shown by the home page with the default date (today), patient (Alphabetically), and round 1 selected.

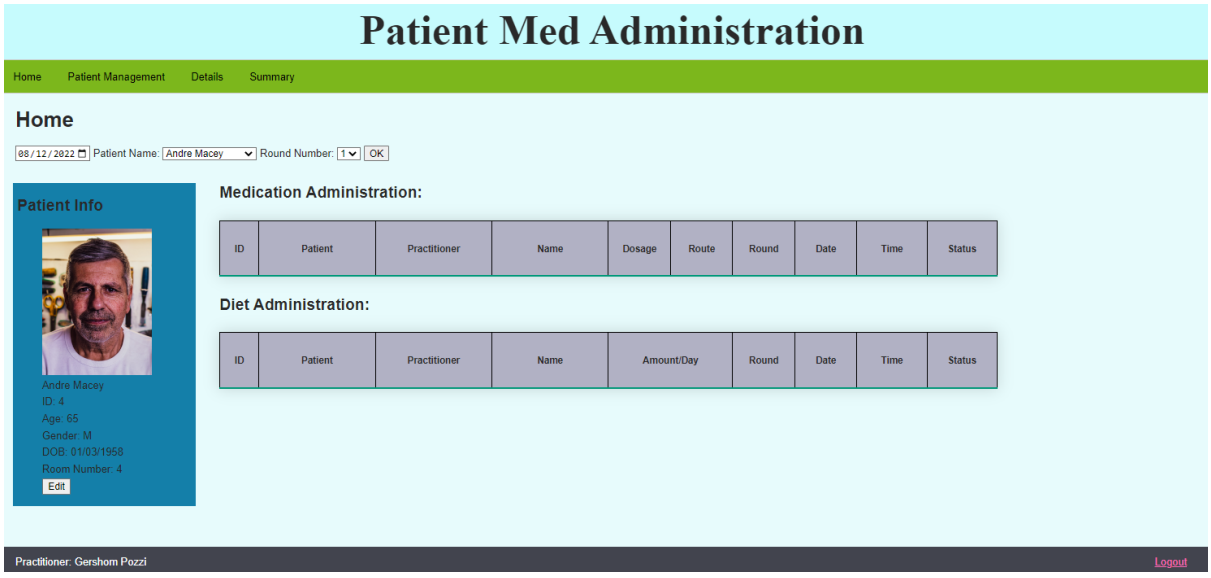


Figure 3. Home page

Navigation tab

There are four tabs that the practitioner can go into; Home, Patient Management, Details and Summary. Practitioners can add new patients in Patients Management. Under detail, there are three tabs, Medication List, Diet List and Patient List. Summary has two tabs under, a medication and diet.

Figure 4. Navigation tab

Practitioner Logout

There is a logout button located at the bottom right of the screen for the practitioner to use when they have finished their session. This logout button will take the user back to the login page and destroy the session so that they cannot access any other pages without logging back in. This adds security to the page to prevent someone from using the back button and activity history to go back to the home page and access patient data or reports.

Diet regime and Medication administration selection

The home tab displays the patient information, the medication administration, and the diet administration of the selected patient. Beneath the heading, is a date selector which the practitioner can use to select a certain date. Besides, a selected patient can be chosen. The patient care by the practitioner logged in is noted with a '*' sign. Then the specific round the practitioner is also selected. After all these choices have been confirmed, the practitioner can press the 'OK'button to display the selected information.

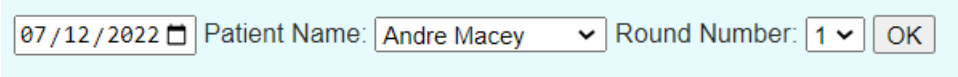


Figure 5. Administration/dispensing search form

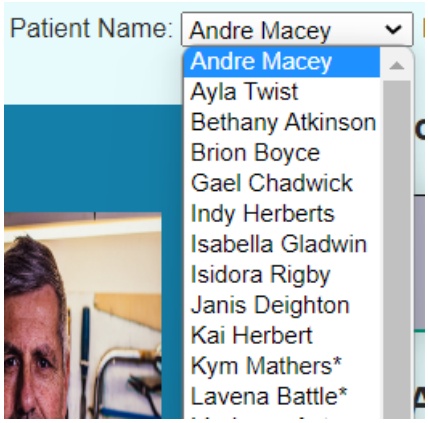


Figure 6. Patient list with cared patient noted

Patient info

On the left-hand side of the page (Fig 6), a Patient Information box lists the current selected patient's data. To search for a particular patient's record, the practitioner can use the form located under the Home page title, select a patient name from the dropdown box and hit the OK button. The name, ID, age, gender, date of birth and room number for the selected patient will be displayed in the Patient Info box. In addition, a previously uploaded patient image is displayed.

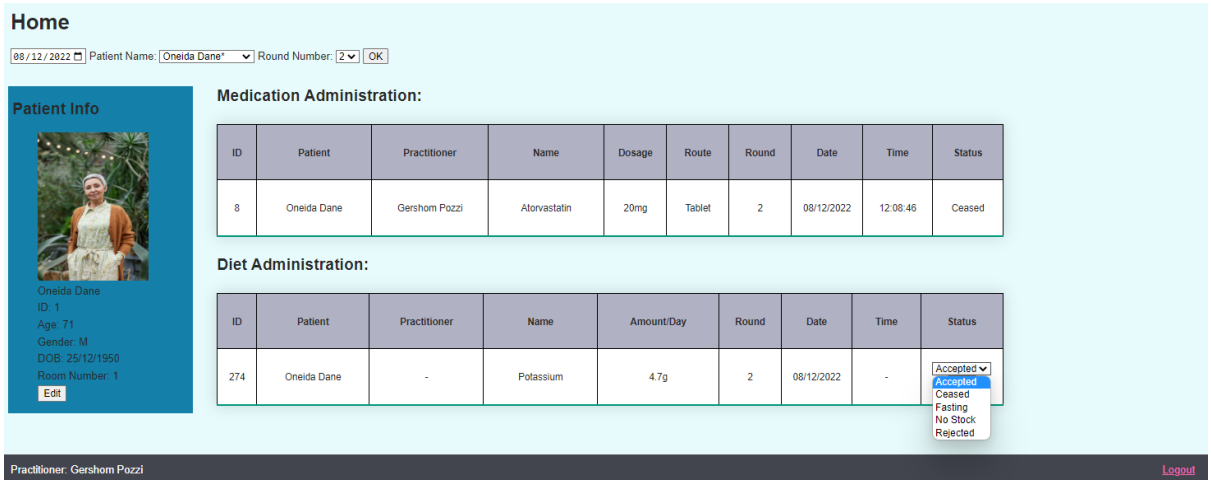


Figure 7. Home page dispensing status and patient data edit

The practitioner can use the Edit button located at the bottom of the Patient Info box. By clicking on the Edit button, the practitioner will be guided to the Edit Patient Information page (edit_info.php).

This form has the information of the previously selected prefilled. The practitioner will only need to make changes to the prefilled value. The form will update the edited information in the database. Upon invalid input, error messages will be displayed on the right-hand side of the input box.

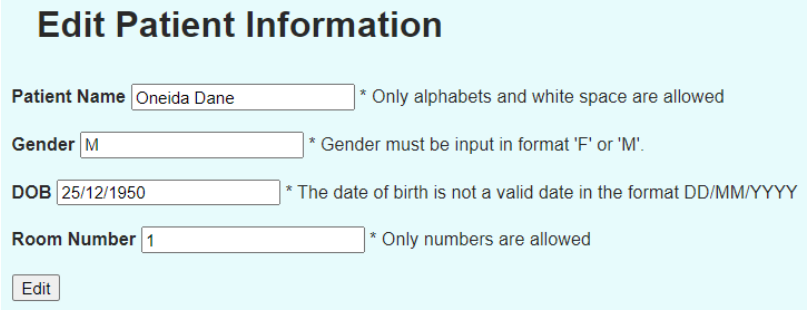


Figure 8. Edit patient data with error message printed if invalid

Medication administration and dispensing

Upon submission of the selection (fig 7), the medication menu can be viewed and prepared and the medication name, dosage, route of administration, menu id, patient name, date of administration is displayed.

The practitioner can update the administration status once dispensed. A dropdown list of Accepted, Ceased, Fasting, no stock and rejected can be chosen depending on the situation. Accepted is selected by default. The user should submit the update form by clicking the Edit button, the page will be reloaded with medication administration data stored and updated. The systems also naturally record the name of the dispensing practitioner and the time dispensed is recorded and displayed.

Diet regime administration and dispensing

The Diet administration is located on the home page shown under the Medication administration. It utilises the same date, patient, and round selection. The diet name, amount/day, patient name, date of administration is all displayed within the Diet Administration table.

Patient management page

The Patient Management tab is where the practitioner can add new patients. This is done by filling out the form. This requires a name, date of birth, gender, and the room number the patient is assigned to. There cannot be duplicated patients, or new patients assigned to a room with an already existing patient. The registration form is shown below in Figure 9.

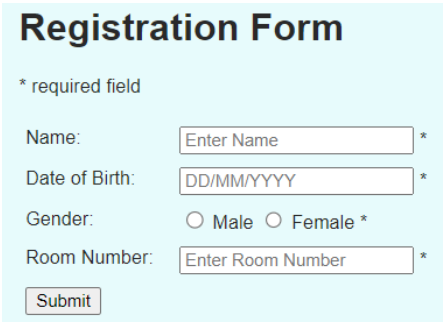


Figure 9. Add patient

If successfully entered, the screen will display the entered information as shown below.

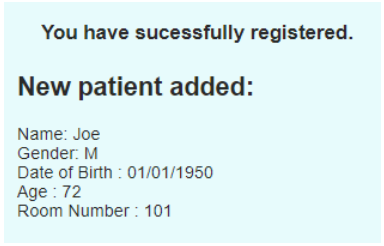


Figure 10. Successful patient registration

A duplicated patient will result in an error message showing.

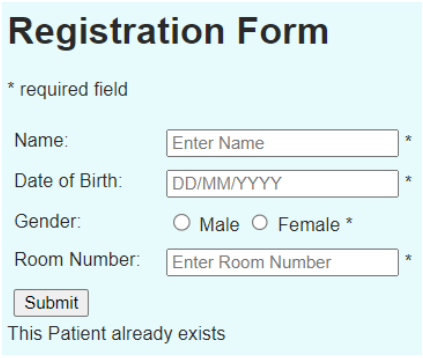


Figure 11. Duplicated patient

Assigning a patient to an already assigned room will display this message.

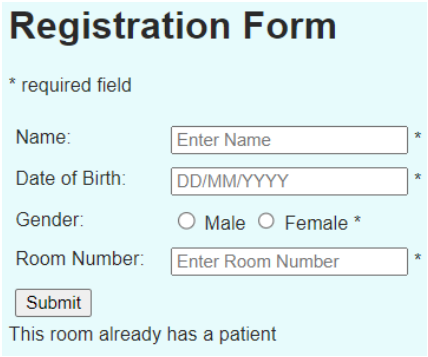


Figure 12. Occupied room error

As we are a health care facility, any date of birth above the 2022 will not be accepted as this is in the future and any year before 1900 will also not be accepted as there is currently no one alive beyond this year.

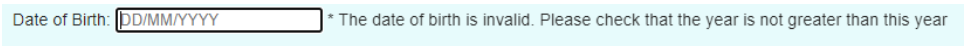


Figure 13. Invalid DOB 1

The date of birth must be put in the DD/MM/YYYY format, failure to do so will result in an error.

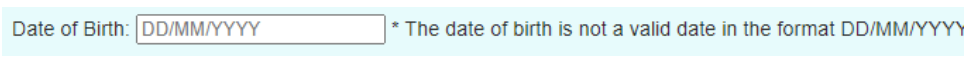


Figure 14. Invalid DOB 2

If no information is put in this error will occur.

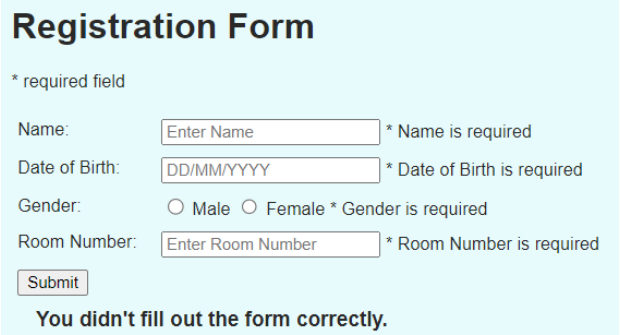


Figure 15. Submission with no input

Medication report

The medication report (*summary_med_date_centre.php*) is in the dropdown tab "Summary" then in the tab, "Medication." By default, today's date is selected, all patients are shown corresponding with the current practitioner that is logged in. A date is selected from a drop-down date picker to allow the user to see a summary for the week where the selected date is the centre date. A specific patient and practitioner or all the patients and/or practitioner can also be selected from a drop-down list. To show the results, the user clicks search, and the results will be displayed in a table revealing the patient's name, medication, dosage, route, round, practitioner, and the status for the full week.

Diet regime report

The medication report (*summary_diet_date_centre.php*) is in the dropdown tab "Summary" then in the tab, "Diet." By default, today's date is selected, all patients are shown corresponding with the current practitioner that is logged in. A date is selected from a drop-down date picker to allow the user to see a summary for the week where the selected date is the centre date. A specific patient and practitioner or all the patients and/or practitioner can also be selected from a drop-down list. To show the results, the user clicks search, and the results will be displayed in a table revealing the patient's name, diet, amount/day, round, practitioner, and the status for the full week.

Examples of four cases of selecting a summary report can be seen in the figures below:

- All patients and all practitioners selected (Figure 16)
- All patients but a specific practitioner (Figure 17)
- A specific patient with all practitioners corresponding to the patient (Figure 18)
- A specific patient with the practitioner corresponding to the patient (Figure 19)

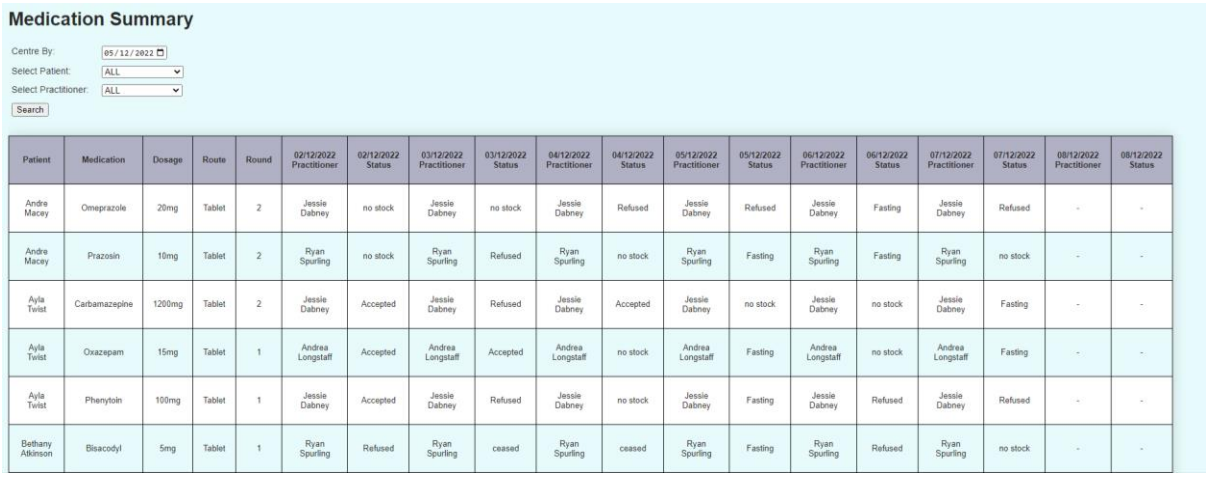
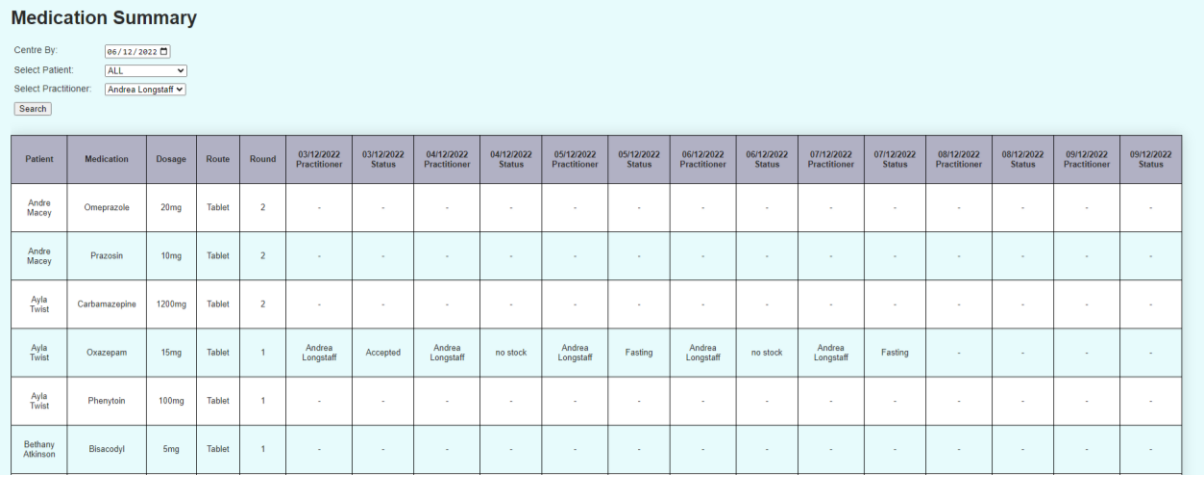


Figure 16. All patients and all practitioners



Medication Summary

Centre By: 06/12/2022

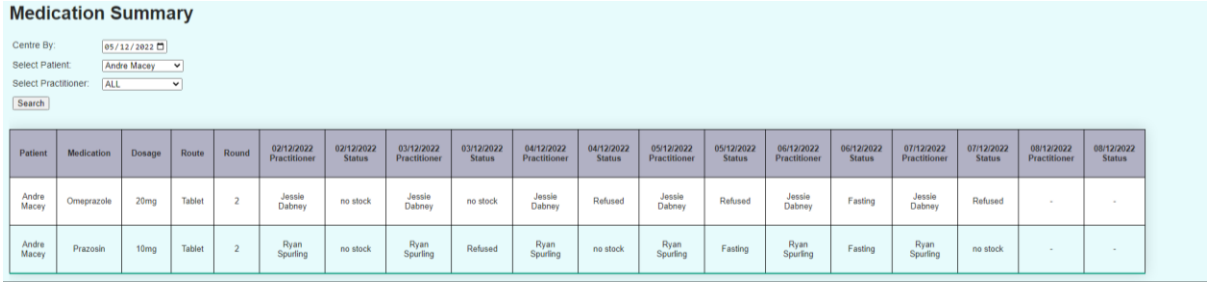
Select Patient: ALL

Select Practitioner: Andrea Longstaff

Search

Patient	Medication	Dosage	Route	Round	03/12/2022 Practitioner	03/12/2022 Status	04/12/2022 Practitioner	04/12/2022 Status	05/12/2022 Practitioner	05/12/2022 Status	06/12/2022 Practitioner	06/12/2022 Status	07/12/2022 Practitioner	07/12/2022 Status	08/12/2022 Practitioner	08/12/2022 Status	09/12/2022 Practitioner	09/12/2022 Status
Andre Macey	Omeprazole	20mg	Tablet	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Andre Macey	Prazosin	10mg	Tablet	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ayla Twist	Carbamazepine	1200mg	Tablet	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ayla Twist	Oxazepam	15mg	Tablet	1	Andrea Longstaff	Accepted	Andrea Longstaff	no stock	Andrea Longstaff	Fasting	Andrea Longstaff	no stock	Andrea Longstaff	Fasting	-	-	-	-
Ayla Twist	Phenytoin	100mg	Tablet	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bethany Atkinson	Bisacodyl	5mg	Tablet	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Figure 17. All Patients selected with a specific practitioner



Medication Summary

Centre By: 05/12/2022

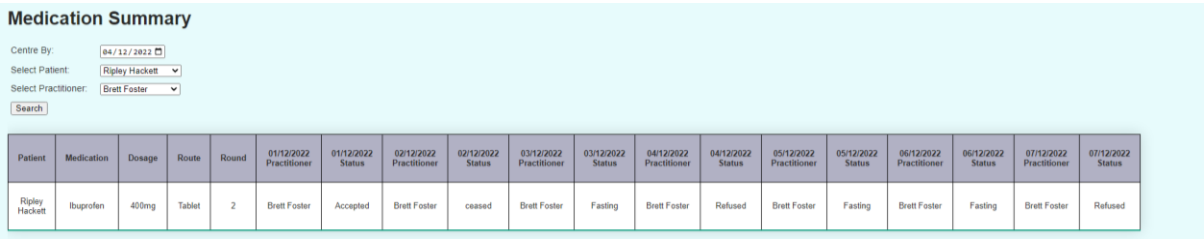
Select Patient: Andre Macey

Select Practitioner: ALL

Search

Patient	Medication	Dosage	Route	Round	02/12/2022 Practitioner	02/12/2022 Status	03/12/2022 Practitioner	03/12/2022 Status	04/12/2022 Practitioner	04/12/2022 Status	05/12/2022 Practitioner	05/12/2022 Status	06/12/2022 Practitioner	06/12/2022 Status	07/12/2022 Practitioner	07/12/2022 Status	08/12/2022 Practitioner	08/12/2022 Status
Andre Macey	Omeprazole	20mg	Tablet	2	Jessie Dabney	no stock	Jessie Dabney	no stock	Jessie Dabney	Refused	Jessie Dabney	Refused	Jessie Dabney	Fasting	Jessie Dabney	Refused	-	-
Andre Macey	Prazosin	10mg	Tablet	2	Ryan Spurling	no stock	Ryan Spurling	Refused	Ryan Spurling	no stock	Ryan Spurling	Fasting	Ryan Spurling	Fasting	Ryan Spurling	no stock	-	-

Figure 18. A specific patient selected with all practitioners



Medication Summary

Centre By: 04/12/2022

Select Patient: Ripley Hackett

Select Practitioner: Brett Foster

Search

Patient	Medication	Dosage	Route	Round	01/12/2022 Practitioner	01/12/2022 Status	02/12/2022 Practitioner	02/12/2022 Status	03/12/2022 Practitioner	03/12/2022 Status	04/12/2022 Practitioner	04/12/2022 Status	05/12/2022 Practitioner	05/12/2022 Status	06/12/2022 Practitioner	06/12/2022 Status	07/12/2022 Practitioner	07/12/2022 Status
Ripley Hackett	Ibuprofen	400mg	Tablet	2	Brett Foster	Accepted	Brett Foster	ceased	Brett Foster	Fasting	Brett Foster	Refused	Brett Foster	Fasting	Brett Foster	Fasting	Brett Foster	Refused

Figure 19. A specific patient with a specific practitioner

Tasks and Approaches

Database Design

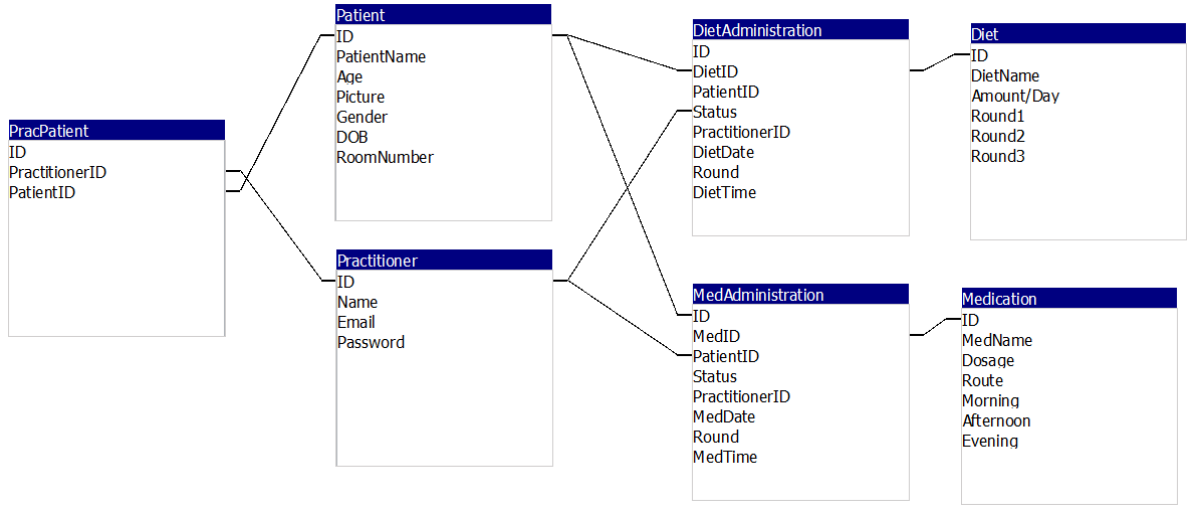


Figure 20. MS Access relationships, with primary key and foreign keys labelled.

The database includes seven tables, and they are:

- Patient
- Practitioner
- Diet
- Medication
- Diet Administration
- Med Administration
- PracPatient

Each of the above tables serve a purpose which contain details about the information required to run a web-based medication and diet regime management system. The registration table has the details of the user registered within our management system. The Patient table includes the details of the patients in our system, this gives the practitioner the easy access to a patient's details. The dietary requirements, medication requirements and the dosage of each medication and the number of dietary requirements needed are specified for each individual patient by their respective practitioner. This can be done once a practitioner logs in and accesses the records of their patients and they can they then provide the necessary information from the drop-down menus for each patient. The dates and times including the round is selected for each medicine and diet separately.

Relational integrity is enforced for each primary key so the system updates automatically whenever a patient is removed from the system, no longer requires a certain medication and/or dietary supplement. Each table has a unique primary key and if related, corresponding foreign keys, as shown in Image 1.

Whenever a Primary key is selected for example if a patient ID is selected as a primary key, MS access automatically determines the foreign key based on the relationship with the primary key. Since every table is automatically assigned an ID which makes it the primary key for that table. The relationships made between two tables get assigned a foreign key to its respective primary key. The primary key for the patient table is ID which has a relationship with a foreign key in the table Diet Administration and

the foreign key in this table is ID. Similarly, each primary key gets a foreign key for every connection made. The images of the patients are hyperlinks and are not a part of this.

The connections are made in such a way that they surround the patient's medications and dietary requirements. These are assigned to the patient by a practitioner, who determines which patient requires what medication and when likewise, the practitioner determines the diet requirements and the time for these requirements. Hence, the connections will have patient and practitioner as primary keys which have diet administration and medicine administration as foreign keys. Both medicine administration and diet administration are primary keys themselves which have medicine and diet as foreign keys, respectively.

Prefilled Medication and Diet menu

Medication

Medication	
Med Name	**Dosage**
Amlodipine	10mg
Cilnidipine	10mg
Telmisartan	40mg
Ramipril	5mg

Table 2. Medication List

The medication table contains a list of medications and the standard dosage taken from the internet. The practitioner uses this table to plan the medicine for a particular patient and administer the medicine for single or multiple rounds per day based on the dosage requirement for that patient. When the practitioner is setting up a course of medication, they can select from the list of medicines and set the dosage and the number of times a patient should take it.

Diet

The diet table contains the names of all the dietary supplements and the standard amount required for each supplement. The practitioner uses this table to plan the diet supplement for a particular patient and administer it for single or multiple rounds per day based on the daily requirement for that patient. When the practitioner is setting up a course of dietary supplements, they can select from the list of supplements and set the amount and the number of times a patient should take it.

Diet	
Diet Name	**Amount/Day**
Calcium	1000g
Vitamin D	20mg
Vitamin B6	1.5mg
Vitamin B12	2.4 mcg
Vitamin C	75 mg

Table 3. Diet List

Prefilled Patient table

The patient table consists of an automatically generated ID as primary key, patient name, Age, Picture, Gender, DOB, and room number reside. Some key points to be mentioned here are Age and Picture. The age is calculated and validated based on the input DOB, as age is considered a piece of essential information for the practitioners in their work. The picture is chosen to be stored in Datatype Hyperlink. This is due to the missing Attachment datatype in the MS Access version. The team has successfully worked through the difficulty and presented patient picture in the product.

Navigation

The navigation between pages is enabled by an HTML file shared across the platform called *nav_bar.php*. The relationship between pages is ordered and organized into the file using <a> tags and dropdown buttons. There are four main types of tabs on this website shown at the top of every page (Fig 4):

- Home
- Patient Management
- Details
    - Medication List
    - Diet List
    - Patient List
- Summary
    - Medication
    - Diet

By including the navigation bar in every file using the PHP function include (). We were able to maintain a consistent navigation bar shown on every page and easy to be updated with minimum code duplication.

Frontend design

At the early stage of the project, the frontend setup was designed and laid out using Lucid Chart. The flowchart shown below illustrates the front-end design followed to set up the Medication and Diet Regime Management System.

Figure 22 further demonstrated the tasks needed to be completed for the project. The design of using four tables mentioned in the guidelines: diet table, medication table, practitioner table, and the patient table did not support enough data to properly run the Medication and Diet Regime Management System following database normalisation rules. Three more tables were added which explained the system much better and the practitioner could use the system effortlessly. With the basic design of the system setup, the tables were displayed on web pages in a format that would make the entire process of assigning a medication and diet regime to the patient seamless. Each of the seven tables includes information that is essential for the user to select the data and structure a regimen.

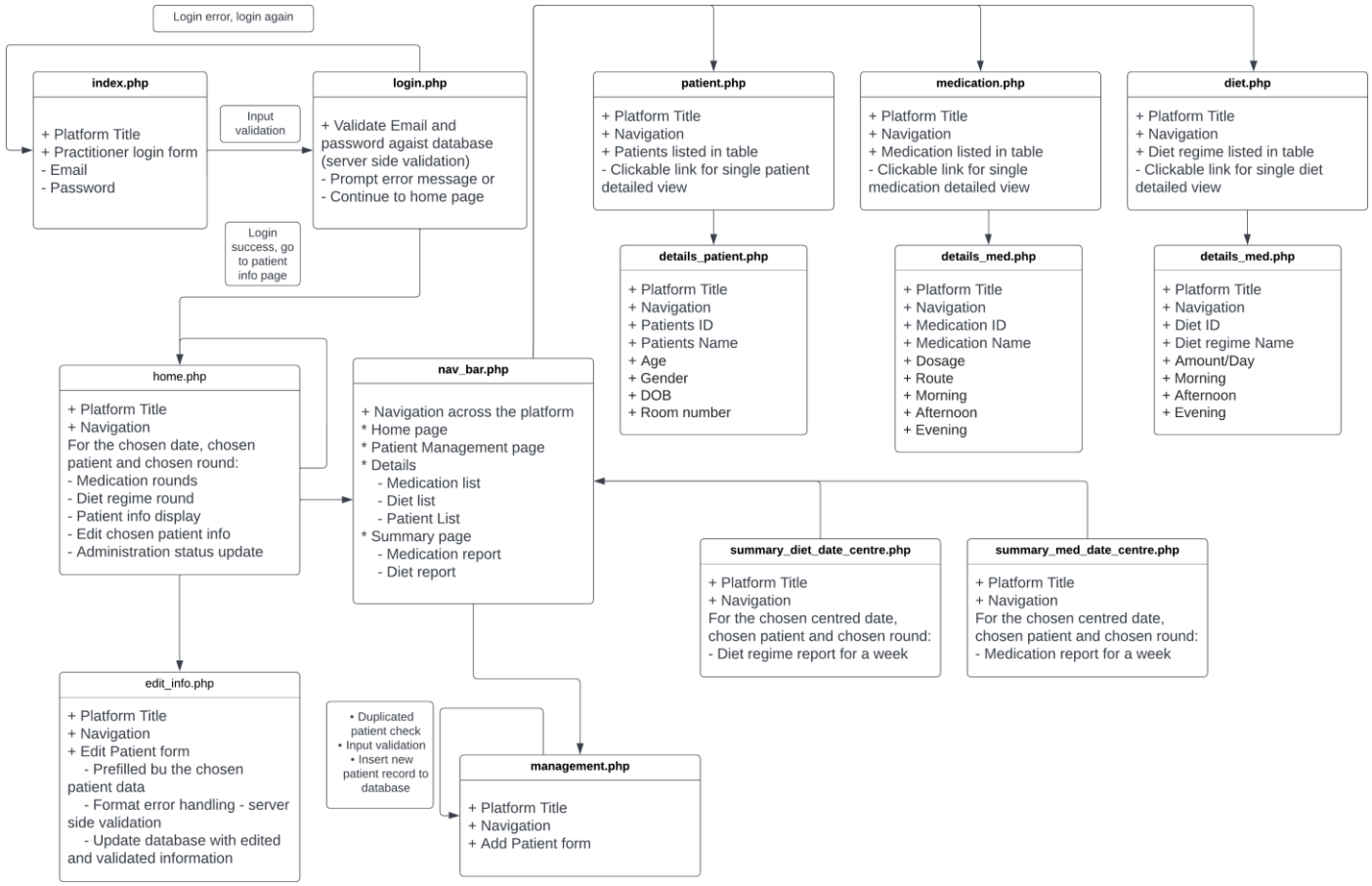


Figure 21. Frontend Design

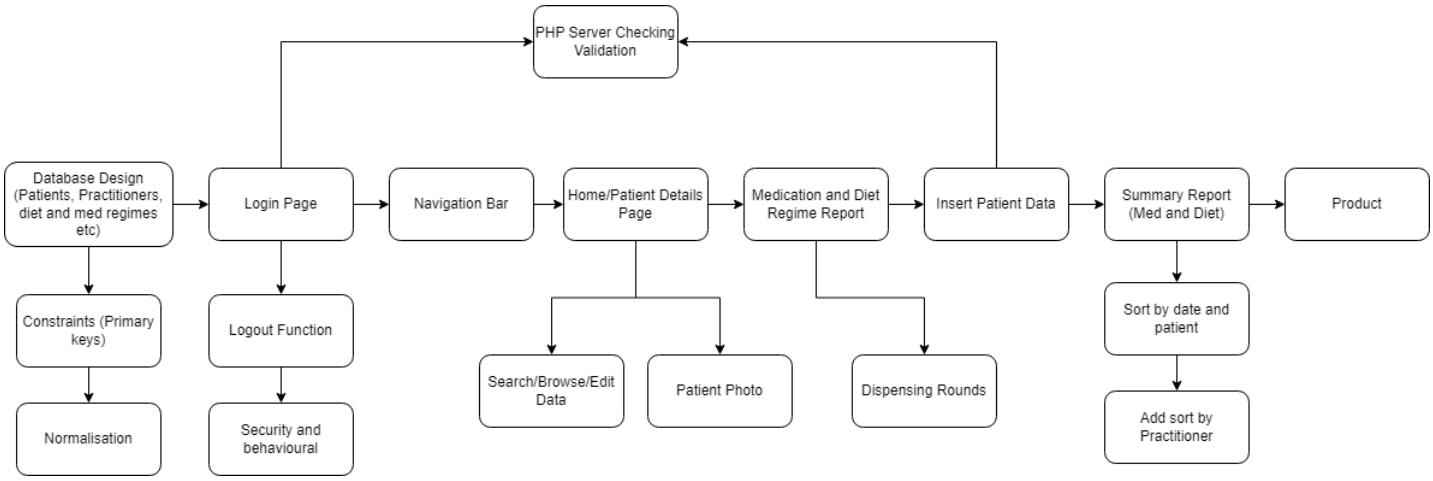


Figure 22. Frontend Server Design

Validation and Error checking

Login

The practitioner's email and password are required when logging in. Email is used instead of a username to protect the database from having to deal with a high possibility of username duplication.

When logging in, the input email and password are validated against the database by completing a database search. It searches for the field with a matching email (case-insensitive), if the email exists it

also matches the password entered with the database, ensuring password is case sensitive too. If the email and password entered is correct, the login page will take the user to a home page otherwise, incorrect details entered will create an alert pop-up.

Add user

The validation performed on the patient management tab is done to verify when new patients are added into the database. This is done by checking that the Name only contains letters and white spaces. The Date of Birth is in a DD/MM/YYYY format, and that the year is between 1900 and 2022, inclusive. This is done by running a date checker as well as defining a set region for the valid years within the code itself. The room number used to add is also validated to make sure that there is not a patient already assigned to that room. This is done by running a query in the database to make sure the inputted room number does not already exist.

Another error check that is performed is to prevent duplicate patients from being added. This is done by making sure that the patient's name and date of birth combination is unique. Two patients cannot have the same name and date of birth. This searches for a matching name and matching date of birth within the database, if any results appear, then the system will mark it as a duplicate and an error notification will appear at the end of the registration table.

Another error check is performed when the submit button is pressed to make sure all fields are filled out. This is done by assigning an error within the code if the field is left blank. This will flag the form and prevent it from submitting any information until all fields are filled correctly.

Edit user

Same rules of validation apply when editing user information. It is to maintain the consistency of data stored.

Summary report motivations and how it works

In the summary report for both medication and diet, default values were selected to create a realistic webpage management system, thus the date was selected as the current date, the table should show all the patient assigned to the practitioner that was already logged in. When the practitioner opens the summary tab, they should be able to see only their patient and the corresponding details. The user can change the selections such as the date, selected a specific patient and/or practitioner. This data will generate specifically for each field, thus only having 4 different cases as in Figure 17, Figure 19, Figure 18, and **Error! Reference source not found.**.

This table was generated by creating a query that link the diet or medication administration tables with the patient's name instead of their ID, details about the diet or medication they are required to take, and the practitioner assigned to the patient and the status of that round. The dates were shown for a full week, with the date selected or defaulted today's date as the centred date. Dates can be easily selected via a dropdown or can be typed in manually. A search button used instead of an onclick submission was for the ease and user friendliness.