

Rare Disease Dose Management Web App System Prpsal(Combimab)

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1. Executive Summary

In fulfillment of the requirements for a software prototype project as part of an academic program at the College of the North Atlantic, our team has developed the Rare Disease Dose Calculation Web App. This innovative software application addresses critical issues related to rare disease dose calculation for biotech treatment, focusing on providing healthcare professionals (HCPs) with essential tools and resources.

2. Introduction:

This software prototype was initiated as part of the Accelerated Software Development curriculum, encompassing the CP 3540 course project during term three. The request for this software came from Eric Stock, President, and CEO of NLHealth, with the goal of creating software for calculating and guiding the preparation and administration of medication for rare diseases. This is a valuable application innovation aiming to address the critical challenges surrounding rare disease treatments by offering a comprehensive set of features.

2.1. Key Features:

The Rare Disease Dose Calculation Web App is designed to support HCPs in administering accurate and safe medication dosages to patients with rare diseases. It offers the following key features:

- **Dose Calculator:** A weight-based dose calculator enables HCPs to determine the required number of vials and the total volume of the dose for a patient, minimizing the risk of over or under-administration.
- **Preparation and Administration Guidance:** Detailed step-by-step guidance on the accurate preparation of intravenous (IV) doses, leaving no room for error. This includes instructions on dilution, mixing, and all aspects of medication preparation.
- **Treatment Doses Calendar:** A visual representation of the treatment duration helps HCPs create and manage complex dosing schedules, ensuring consistent dosing throughout the treatment.

This prototype serves as a foundation that can be further developed, expanding its capabilities and impact within the field of rare disease treatment. The Rare Disease Dose Calculation Web App is presented with a complete system proposal, including system plans and requirements definitions, system models (structural, behavioral, and functional).

Our team is grateful to NLHealth for the opportunity to work on this project and is eager to address any further questions or concerns. The software prototype and all updates are available on GitHub for review, accessible at:

<https://github.com/DMbyMHassan/Combimab>

Please refer to the table of contents for a comprehensive overview of the system proposal. We look forward to further discussions and collaboration to enhance this exceptional product for NL HEALTH and the broader healthcare community.

2.2. Development Methodology:

Rare Diseases DOSE Calculation Web App will be designed using Agile project development plan. The project structure would be shared among four people in a team. We expect to have efficient software within 6 weeks. Due to variance in time zones among team members, progress meetings would be at a time that is convenient for everyone on a weekly basis, and these meetings will be conducted using Microsoft Teams. Positive criticisms and feedback would be utilized to ensure that the team is on track and the project meets the timeline.

GitHub will be used as a repository for source code management and to keep track of changes in code within the team. The project will be shared within the team, where some team members work on the front end, while some work on the back end.

3. Requirement Definition

3.1. Functional Requirements

3.1.1. Controls:

- User Inputs:
 - Ability for healthcare professionals (HCPs) to input patient weight for dose calculation.
 - Input fields for starting date and duration of treatment in months.
- Functional Buttons:
 - A "Calculate" button for calculating the required vials and total dose volume.
 - A "HCP Support" button to transfer to HCP authentication page.
 - A "Volume" button to generate infusion Volume.
 - A "infusion" button to generate infusion specification.
 - A "Preparation" button to transfer to preparation page.
 - A "Calendar" button to transfer to calendar page.
 - A "Preparation info" button to generate step by step preparation guidance.
 - A "Calendar info" button to generate Calendar data.
 - A "Download" to download the calendar.
 - A "Safety Card" to generate safety information.

3.1.2. User Management:

- Only Health care professional could login in the HCP support pages using authentication and consenting that the current user is HCP.

3.1.3. Interface:

- The home page will have display for the functions that every page could provide with user friendly interface.

3.1.4. Guidance Repository

- Maintain a repository of detailed preparation and administration guidance for various medications and conditions.

3.2. Non-Functional Requirements

3.2.1. Cultural & Political:

- Compliance: Ensure the application complies with relevant medical, privacy, and data protection regulations.
- Localization :Could include bilingual support in English and French.

3.2.2. Hardware and Operation system

Technology:

- React.js, Node.js, MongoDB:
 - Use of React.js for the frontend, Node.js for the backend, and MongoDB for data storage.
- Git/GitHub:
 - Version control system for collaboration among team members.
- DNS:
 - Configured domain name system for the web app's accessibility.
- OAuth:
 - Implement OAuth for user authentication and data tracking.
- The web application will feature JavaScript functionality allowing dynamic interaction with users. The app will work with an internet connection to fully utilize its capabilities and offer a responsive user experience.
- Internet Connectivity: The app must operate online, requiring a stable internet connection to perform optimally.

3.2.3. Performance:

- Availability and Scalability:
 - Hosting the application on AWS to ensure 24/7 availability and scalability for handling increased user load.

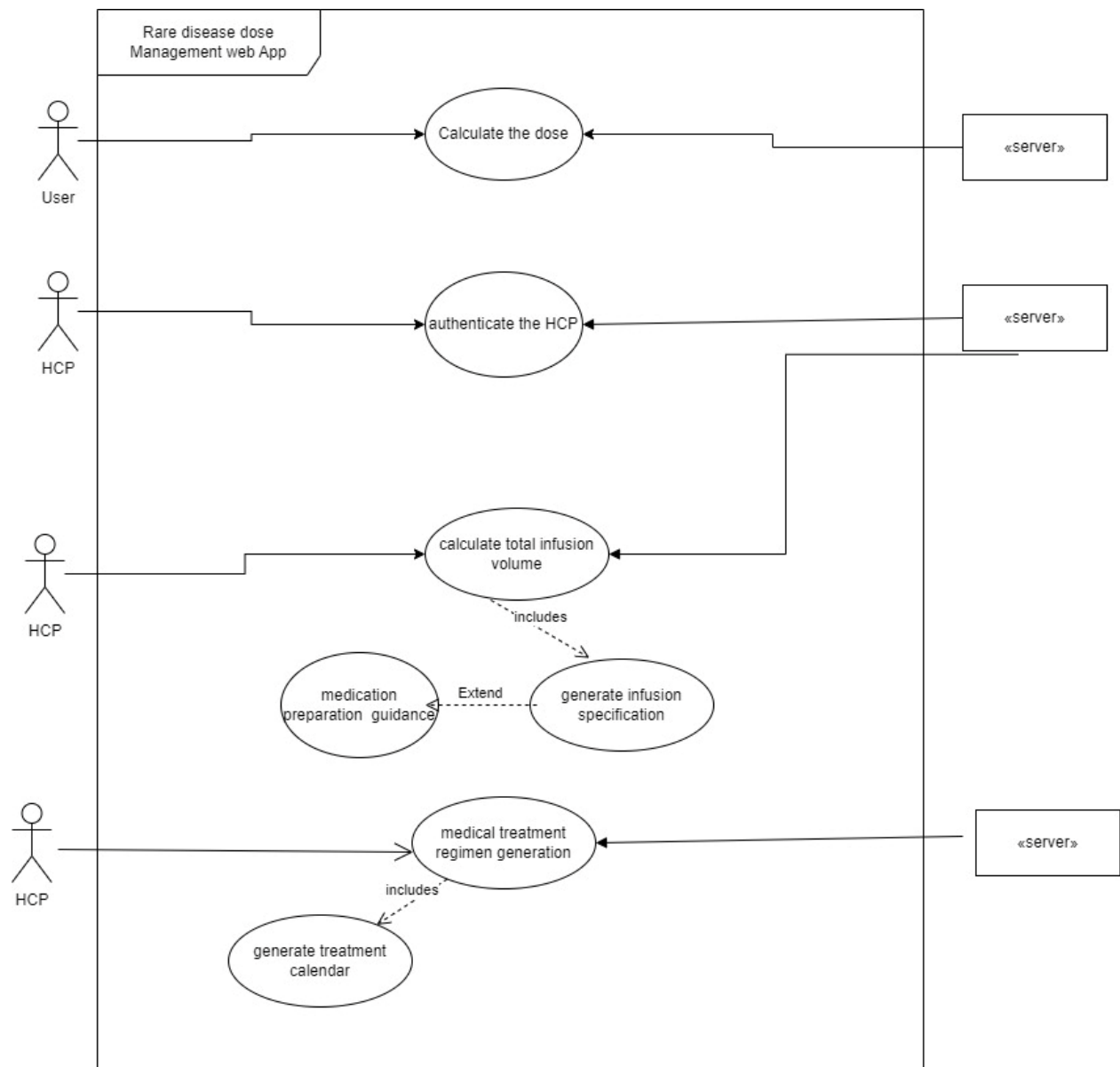
3.2.4. Security:

- The application will employ the HTTPS protocol to encrypt data.
- Implement strong user authentication measures to ensure that only authorized users can access the application.

4. Functional Models

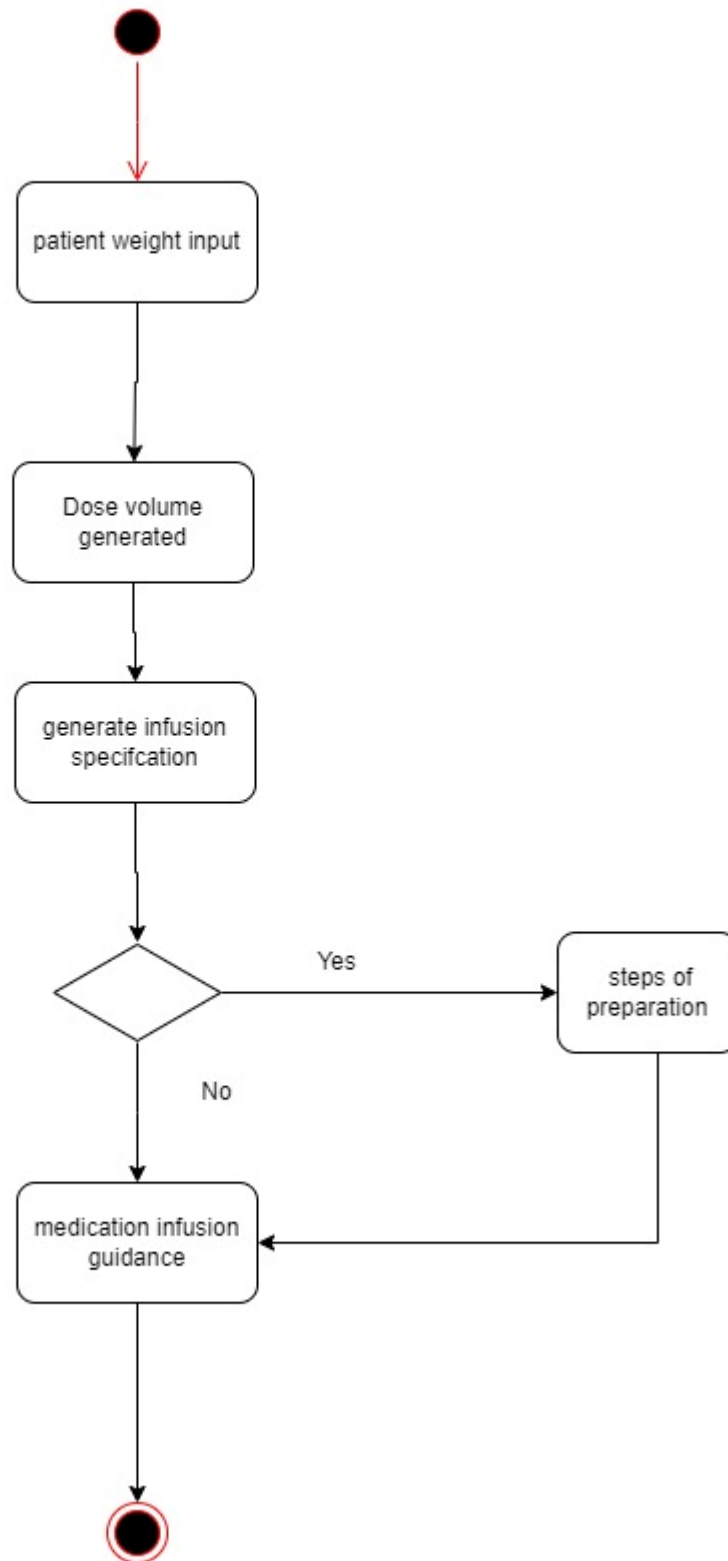
The functional models created for the prototype for Rare disease web App (Combimab) a use-case diagram and two activity diagrams. The use-case diagram demonstrates the possible interactions that the actors, which in this case are either general user or Health care professional need support (HCP) and the server will generate the data. The activity diagram portrays the primary activities that take place for Dose Specification generation and either go for step of preparation or generate treatment regimen calendar as shown in the second activity diagram.

4.1. Use-case Diagram

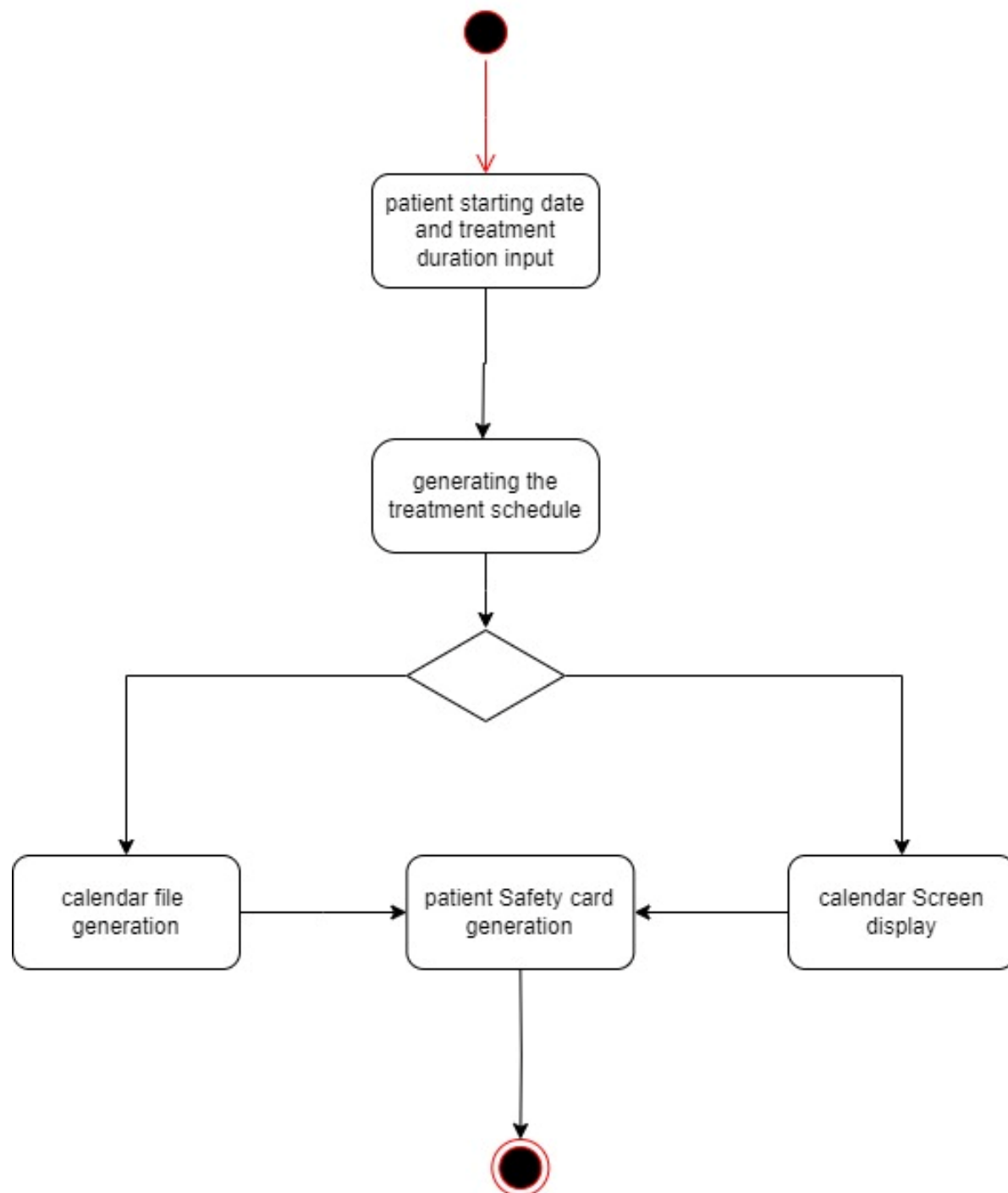


4.2. Activity Diagram

Activity Diagram for Dose specification generation Activity Diagram

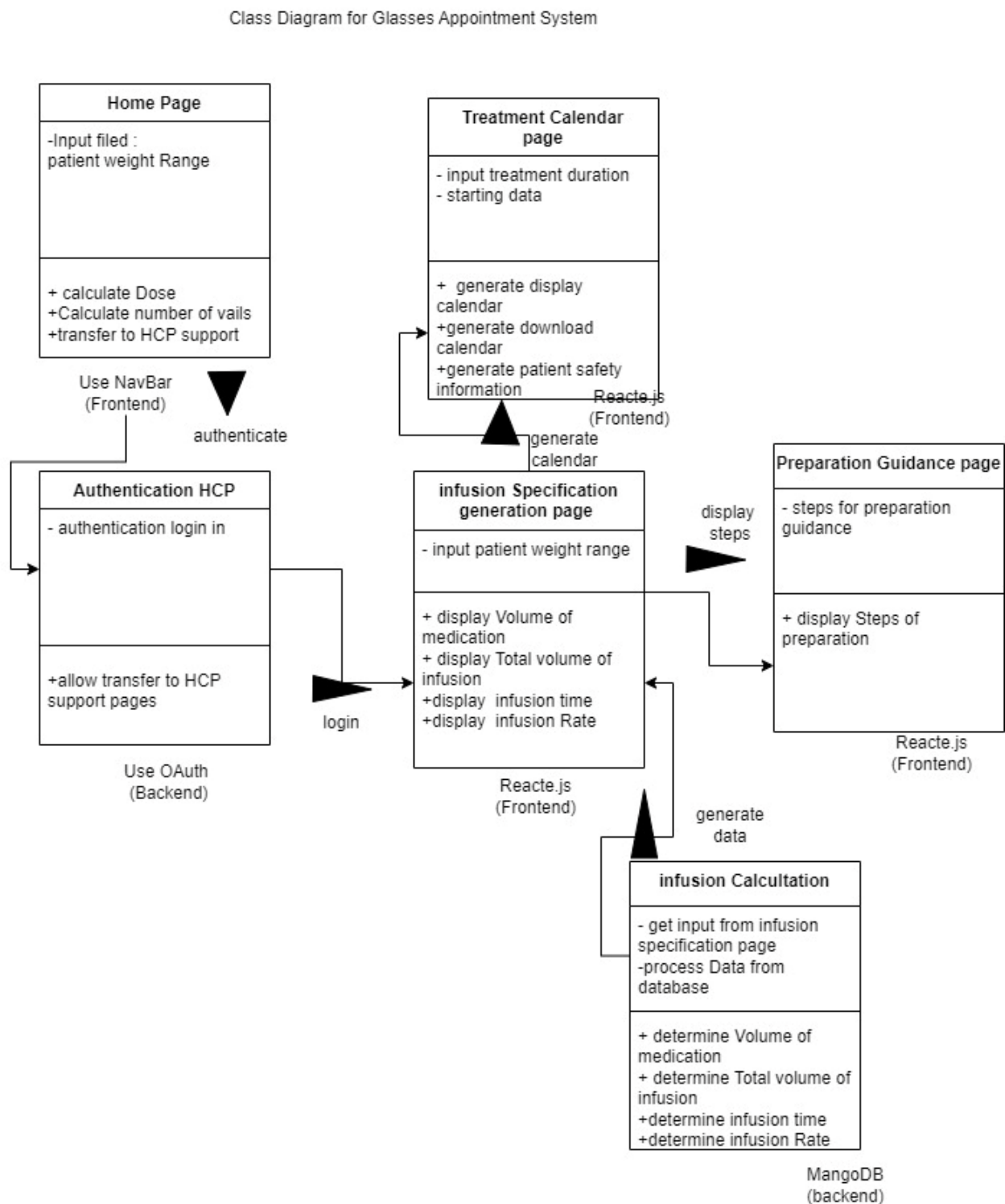


Activity Diagram for medical treatment regimen generation Activity diagram

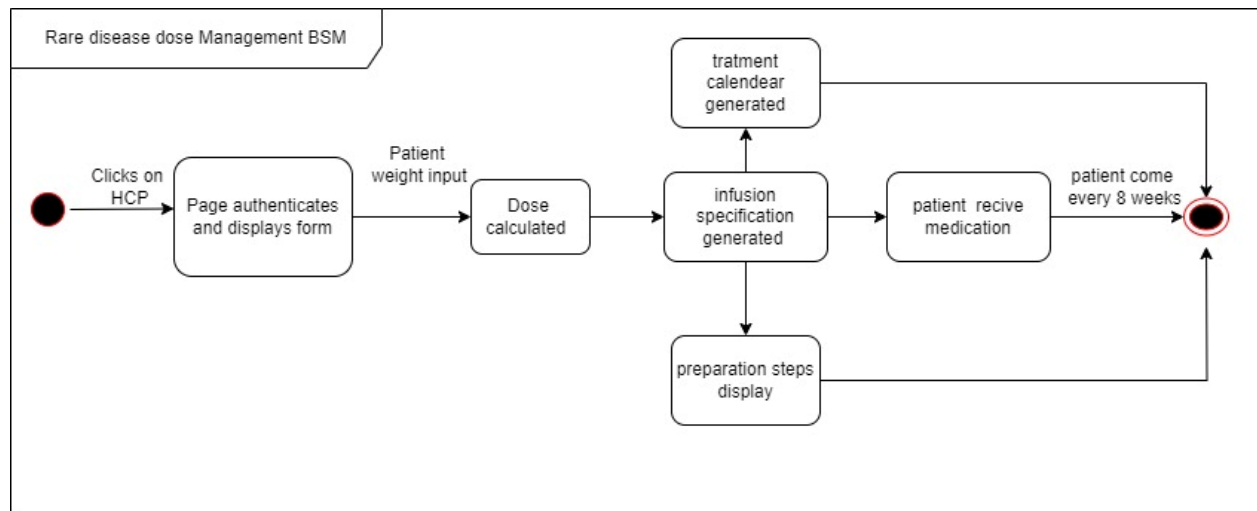


5. Structural Models

5.1. Class Diagram



5.2. Behavioral state machine



6. UI Mockup of the website

COMBIMAB

https://combimab.com

HCP Support



Weight-based 100 mg/mL dosing calculator
for patients with PN

Patient weight

Enter patient weight

Kg

CALCULATE


Dose (mg)	xxx mg
100 mg/mL formulation vials	xxx vials 300 mg/3mL

COMBIMAB

https://combimab.com


PREPERATIONinfo

HCP Support




STEP 1

XXXXXXXXXXXXXXXXXXXXXXX



STEP 2

XXXXXXXXXXXXXXXXXXXXXXX



STEP 3

XXXXXXXXXXXXXXXXXXXXXXX

