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Development of A Notification System for Child Delivery in The Labour Room

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ABSTRACT

The healthcare system is essential to sustenance of lives of everyone. The health of every pregnant woman and the babies are equally important so as to reduce the mortality rate during child birth. The rapid changes in clinical maternity situations that occur in a labor and delivery unit can lead to unpredictable maternal and newborn morbidities (Cheng *et al.*,2023*)*. Existing works developed birth alert system prior to child's birth which is issued by the child welfare workers without the consent of the expectant parent (Sistovaris, 2022). In many hospitals, especially in developing countries, there is a noticeable communication gap between healthcare providers and patients' families during childbirth. This often leads to anxiety due to delay encountered in notifying the next of kin when the baby has finally arrived. Therefore, this system was developed using React, Express.js and Supabase, along with an SMS API integration for message dispatch. The system automates this communication, ensuring that registered family member receive prompt updates once a delivery has occurred. This can bring immediate emotional relief and allow the family to prepare for any necessary support or visit.

Keywords: Healthcare, labour room, delivery unit, communication.

1. Introduction

In the hospital, the information system in relation to the work system shares common processing activities like capturing, transmitting, processing, manipulating and also information handling (Plsek, 2019). The time information reaches the authorized person is important as the quality of the information (timely information delivery). Also, according to Day *et al.*, (2020) Improving quality of care at birth could save an estimated 3 million lives per year. For women, childbirth is the most common reason for hospital admission (Cheng, 2020). The labour ward is a demanding and rewarding area of specialized work (Jessica *et al.*, 2022). The process begins with patient registration, followed by staff confirmation of delivery, which activates the SMS sending feature. The system is designed to be simple, user-friendly, and efficient, allowing hospital staff to register patient details and those of their next of kin, and to trigger automated SMS notifications once delivery is confirmed. According to Shams *et al.*, (2021) labour room management is in four phases but all to ensure safe delivery of the child. Due to the fact that the labour ward is always visited by large number of pregnant women as patients, there is need for automation of some processes in order to save time for adequate service delivery, as stated by Obansola (2023) nobody wishes to stay in the hospital longer than necessary while receiving treatment in the hospital. This paper aims at developing an alert notification system that delivers timely and personalized messages to the next of kin upon the successful delivery of a baby in the labor room by designing a user-friendly interface for hospital staff to register patients and their next of kin, creating a backend system that automatically triggers SMS notifications upon confirmation of childbirth, integrating a SMS gateway that ensures reliable and timely message delivery and storing and managing next-of-kin contact information securely in the database. Finally, the development of a notification system for child delivery in the labor room holds significant value for healthcare service delivery, communication, and family involvement in maternal

care because pregnancy and the postpartum period are a time of significant physiological adaptations that can impact on the presentation, assessment and diagnosis of common medical problem (Bethan, 2024).

2. Methodology

The development of the SMS-based childbirth notification system adopted a phased, iterative approach, similar to a simplified Waterfall model, ensuring that each step is completed and validated before proceeding to the next as depicted in Figure 1. The notification system employs a client-server architecture, with a web-based client for medical staff input and a backend server handling the core logic and SMS communication.

1. Web Application (Frontend): This is the user-interface section, accessed by medical staff via a web browser (on computers or tablets). Its primary function is to provide an interface for entering delivery details.

2. Backend Server: This central component hosts the application logic. It receives data from the web application, perform validation, interact with the database, and communicate with the SMS Gateway to dispatch notifications.

3. Database: A relational database stores all relevant information, including delivery details, message logs, and recipient contact information.

4. SMS Gateway: This is a crucial external service that the backend server integrates with via Supabase. It is responsible for the actual transmission of SMS messages to mobile networks.

5. Medical Staff Mobile Phones/Devices: These are the recipients of the automated SMS notifications.

The development of the notification system for child delivery in the labor room via SMS employs a modern, scalable web technology stack that combines React for the frontend interface, Express.js for the backend server, Supabase as the database and authentication layer, and a third-party SMS API (such as Twilio or Africa's Talking) for SMS delivery.

Frontend – React.js: The frontend of the application is developed using React.js, a popular JavaScript library for building fast, dynamic, and interactive user interfaces. React enables the creation of reusable components, which simplifies the design of forms used by labor room staff to input childbirth details such as mother’s name, time of delivery, and delivery remarks. Also, Backend – Express.js (Node.js Framework): For the backend, the system uses Express.js, a lightweight and flexible Node.js framework that simplifies API development and server-side logic. Express handles routes for user authentication, form submission, and SMS dispatching. When a childbirth event is submitted from the React frontend, Express processes the request, validates the data, and triggers the SMS sending logic via an external SMS API. In the same way, Supabase – Database and Authentication: Supabase serves as the backend-as-a-service (BaaS) platform, providing PostgreSQL-based cloud database services, authentication, authorization, and real-time data syncing. Supabase stores patient details, delivery records, staff accounts, SMS logs, and recipient contact information. Authentication is handled through Supabase's built-in user management system, ensuring only authorized labor room staff can access and use the system. Similarly, SMS Provider Integration (Since Supabase does not natively support sending SMS) the system integrates an external SMS gateway such as Twilio, Nexmo (Vonage), or Africa's Talking. When the Express.js server receives childbirth event data from React, it constructs a message and sends a request to the SMS API with the recipient's phone number and message content.

In terms of security, that is authentication and authorization, the system uses Supabase Authentication to manage user login. This ensures that only authorized hospital staff (e.g., nurses, midwives, or doctors) can access the system a situation in which each user must log in using a verified email and password. Similarly, in terms of data privacy and access control, Supabase provides Row-Level Security (RLS), which means we can set rules on who can see or update specific data in the database through a secure API Keys, the system uses an external SMS provider (like Twilio) to send messages.

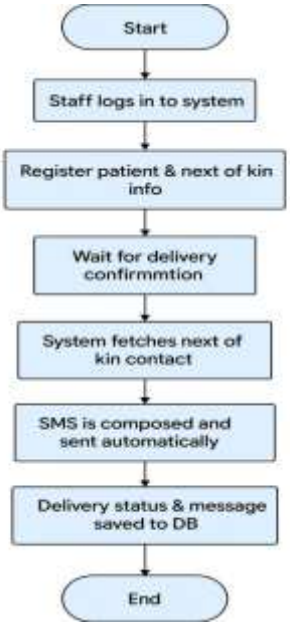

Fig. 1 - The process flow of the developed system

3. Results

This module shows the output of the login page of the medical staff for various medical users, the nurse(s) and the administrator will complete their tasks. Figure 2 shows the log in page of the developed system while Figure 3 shows the registration page where the medical record officer registers the patient before proceeding to the labor room. At the nurse station, the nurse checks the list of registered patients and accept them for room allocation as depicted by Figures 4 and 5 respectively. Finally, the administrator ensures smooth running of all the requests as depicted by Figures 6, 7 and 8 respectively.

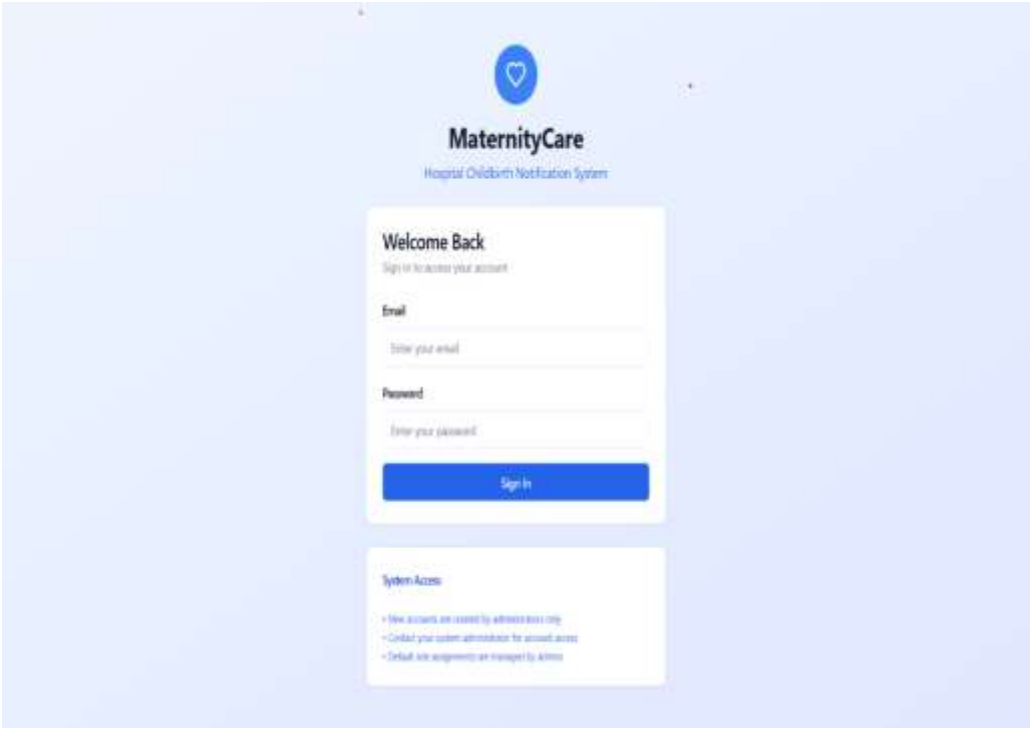

Fig 2 – The log in page of the developed system

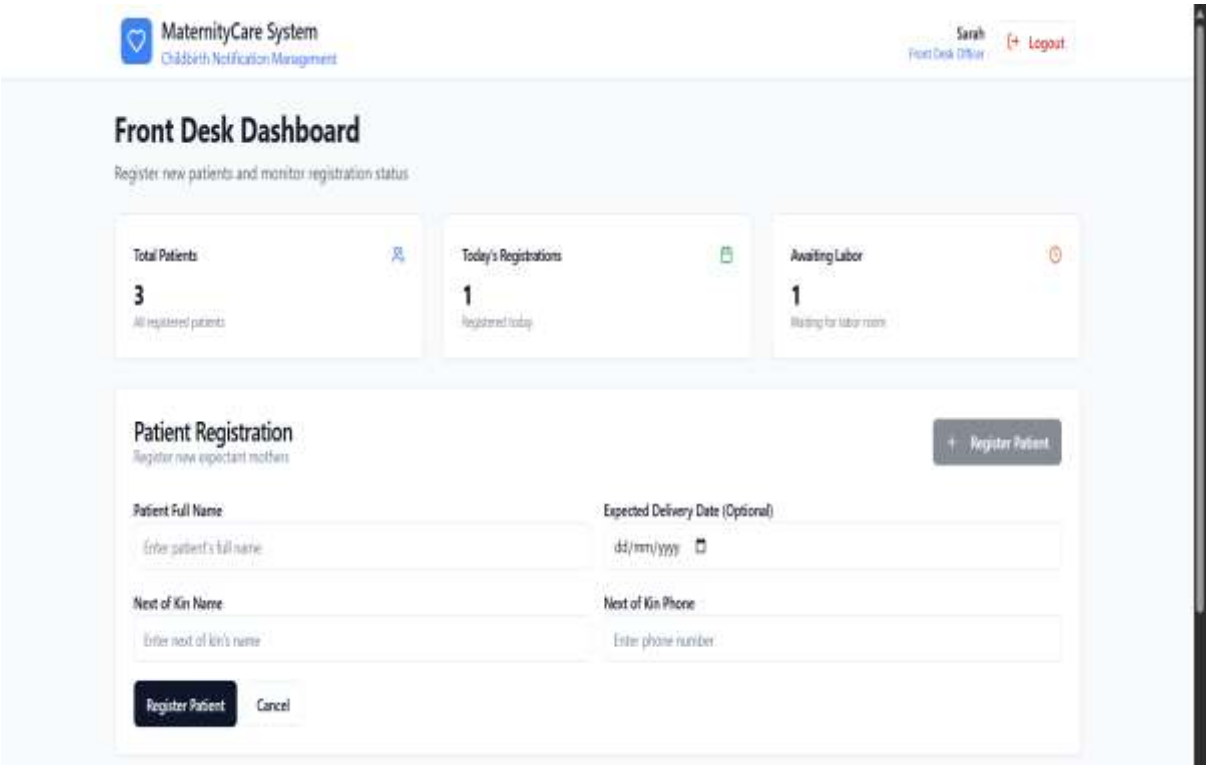

Fig 3 – The registration page of the developed system

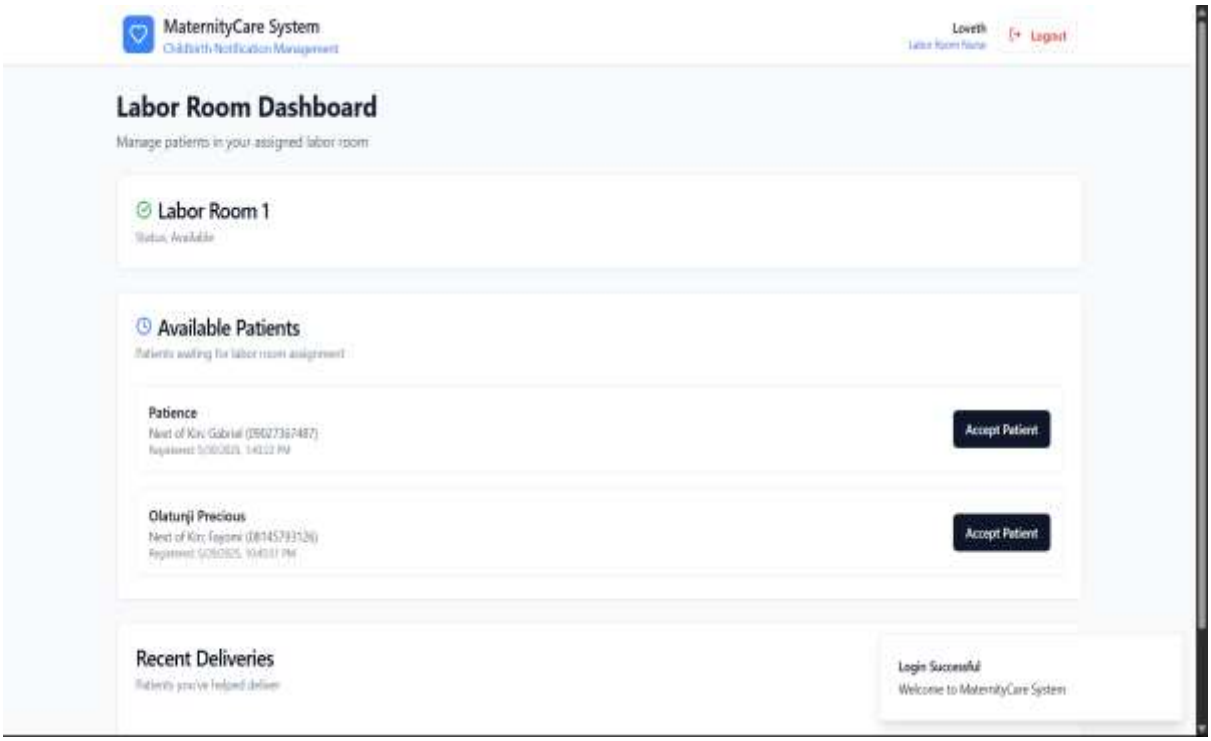

Fig 4 – The nursing section for room allocation of the developed system

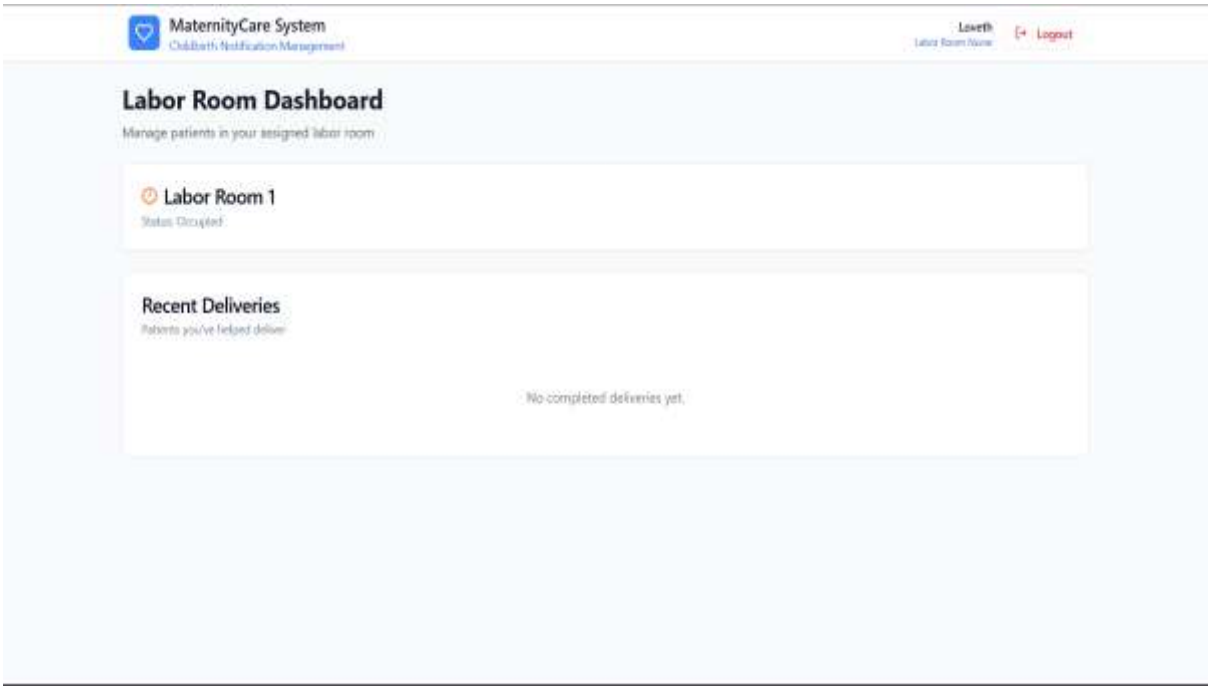

Fig 5 – Output page of rooms allocated to pregnant women awaiting delivery

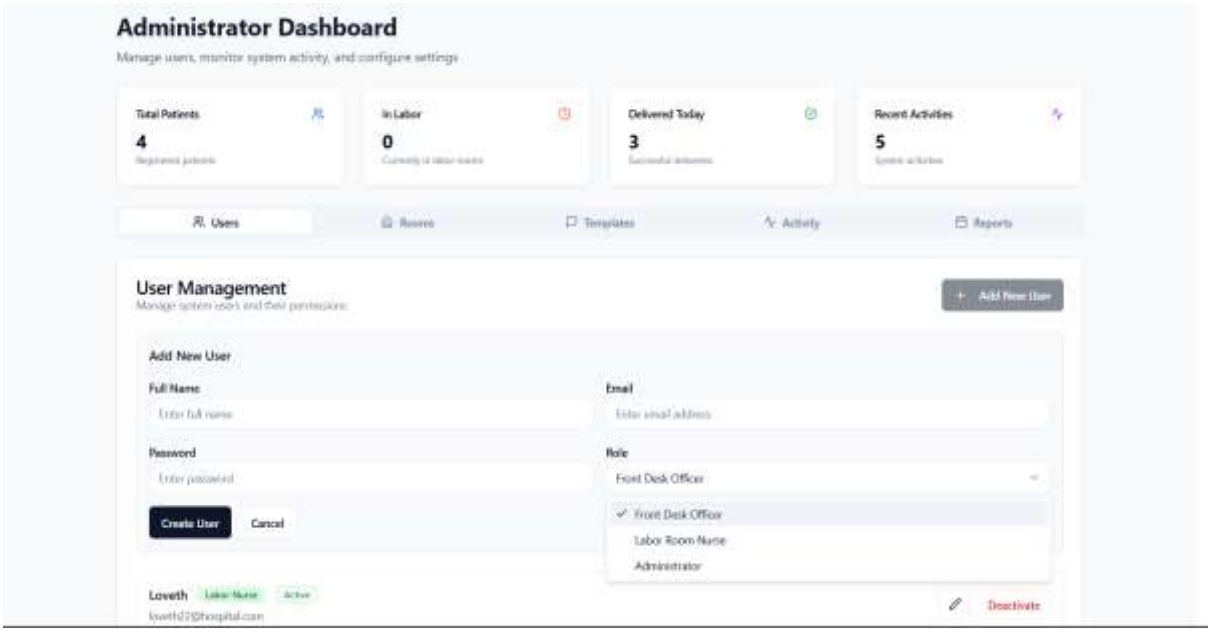

Fig 6 – The administrator page of the developed system

Fig 7 – The screenshot of the SMS delivered to the next of kin

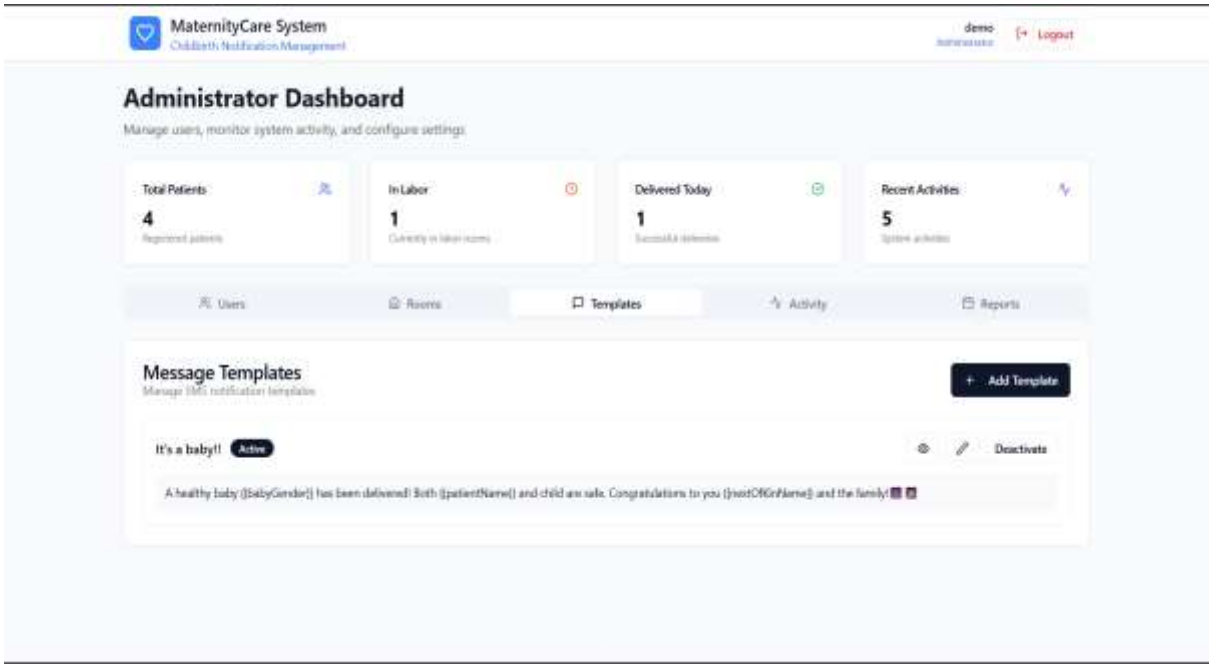

Fig 8 – The output screen of the administrator's report

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