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StockMeds: Simplifying Medicine Management with an Integrated Online Platform

Shreya Patle[1], Shreya Mate[2], Siddhi Jathade[3], Gayatri Aglave[4], Bhagyashri Dhabale[5], Vaidehi Pilondre[6], Prof. Anupam Chaube[7]

[1,2,3,4,5,6,7]Department of Science and Technology,
[1,2,3,4,5,6,7]G H Raisoni College of Engineering and Management, Nagpur, Maharashtra, India

ABSTRACT

The report is about web based medicine inventory management system named MediStock. The system will be used by the pharmacists and staffs of the company The project is designed for developing the medical store management system whose purpose is to reduce the complexities of record keeping and documentation in the inventory management, payments and list of suppliers. Effective inventory management is crucial for healthcare facilities to provide timely and high-quality patient care while minimizing costs. Medistock inventory management systems have been developed to optimize inventory control, but their implementation can be challenging due to various factors such as data inaccuracy, inadequate training, and lack of standardization. This literature review provides a comprehensive overview of the current research trends in Medistock inventory management systems. The review highlights the importance of inventory management in healthcare facilities and discusses various techniques proposed to optimize inventory control, including the use of radio-frequency identification technology, artificial neural networks, and just-intime inventory management systems. The review also examines the challenges associated with Medistock inventory management systems and potential solutions to these challenges. The findings suggest that implementing effective Medistock inventory management systems is crucial for healthcare facilities to optimize inventory control, reduce costs, and enhance patient care. However, a comprehensive understanding of the healthcare facility's unique needs and challenges is required to implement an effective inventory management system.

1. INTRODUCTION

Medical inventory management is a critical component of healthcare operations, as it ensures timely patient care, reduces costs, and improves profitability. Medistock inventory management systems are designed to help healthcare facilities manage their inventory efficiently, thereby enhancing patient care and reducing operational costs. With the advent of technology, various inventory management techniques have been developed to optimize inventory control in healthcare facilities. However, despite these advancements, healthcare facilities still face numerous challenges in managing their inventory effectively.

MediStock is an inventory management system which manages the medicines of the distribution company. This company distributes the medicines outside to a large number of medical stores. This company is managing the stock by making use of the paper based system. The pharmacists makes the orders through medical sales representative. Medical sales representative orders the medicines by contacting the company through the phone. Company staff writes the pharmacist' orders on the book. Hence the company is having difficulties in managing the stock when they are using the paper based system.

This literature review aims to explore the current research trends in medistock inventory management systems. The review will discuss the importance of inventory management in healthcare facilities, as well as the various techniques that have been proposed to optimize inventory control. It will also examine the challenges associated with medistock inventory management systems and the potential solutions to these challenges. Overall, this literature review seeks to provide a comprehensive understanding of medistock inventory management systems and their impact on healthcare operations. By reviewing the existing literature, this study aims to identify the most effective strategies for optimizing inventory control in healthcare facilities, thereby enhancing patient care and reducing operational costs.

Problems of using the paper based system:

- Most of the medical representatives are making excess orders.
- Most of the customers are facing time consumption when they order through the phone.
- Some medical representatives do delay to make an order with Company. They forget to make the orders.
- When the medical representatives forget or delay to make an order to 10 Company, this is making delay to deliver the goods to the customers.

Aims of MediStock:

- To track the orders of the medicine from the pharmacists.
- To make easier for Medistock to manage the stock of the medicines.
- To prevent the medical sales representatives from making the ordersof medicine from the pharmacists.

User Requirements:

- The following are the user requirements for MediStock:
- Company wants to avoid the medical sales representative to make an order from the hospitals or pharmacies.
- Company wants to have direct contact with the pharmacies.
- Company wants the medicine to be ordered instantly.

- Pharmacists wants the medicine to be delivered without getting delayed and want to avoid the medical sales representative frommaking the order.
- Company and Pharmacies want to save the order as pdf files.
- Company wants to avoid pharmacists from over ordering the stock.
- Our stock details should not be able to edit by the pharmacists.
- Company wants to add and update the stocks.
- Company wants to display the stock available to the pharmacists.
- Company should see the pharmacists' orders.
- The order details of a pharmacist should not be displayed to other pharmacists.

2. Purpose of StockMeds:-

It is a system consists of data entry, retrieval and monitoring stock facility and also alerts of expiry dates and minimum quantity of each drugs. This system refers to the database by drugs name, drug code and description of the drugs. This system provides two alerts one for expiry date of medicine and another one for quantity of the drugs. The system checks the date up to-date to remind pharmacist by trigger alert message if the drugs is about to reach the minimal quantity. Giving alert to the pharmacist will be able to control the stock of the drugs efficiently (RAZALI, 2005). Pharmacy Information System collects, stores and manages information relating to drugs and monitors the use of the drugs with patient care. Pharmacy Information management System tracks and dispense the medicine to the hospitals and health care organizations. This system is widely used in the clinics and other health organizations today. This system has been regularly used for delivery of pharmacy services since early 1980s. Nowadays system is able to perform function of clinical decision support such as dose range checking, drug-drug interaction checking and drug-laboratory results. This system will reduce the risks of drug dispensation and drug interpretation errors (Asadi, Moghaddasi, Hosseini, Sajjadi, & Maserat, 2011).

2.1. Existing Related Systems

- **Fully Integrated Pharmacy Information Management:** This system has billing for hospitals, report generation for inventory reports, prescription management and patient profiles for looking at the information of lab results. Also, this system has inventory management for maintaining the counts of stock levels which will alert when the level reaches the certain point.
- **Med Star Pharmacy Management System:** It is cloud based software which can be accessible by every user around the world. This software has modules like inventory, centralized billing, Point-Of-Sale (POS) and Material Movement tracking.
- **QS/1 Pharmacy Management System:** This system monitors the changes in the quantity of the inventory and it helps the pharmacists to restore the stock quantities to match the demand of the prescription. Dashboard provides a real-time overview of all the activities of the prescription.

2.2. Proposed System

The proposed system, MediStock, involves two users: an accountant and a pharmacist. The system allows pharmacists to view and order stocks, while the accountant has the privileges to edit and update the stock details. Unlike the existing systems mentioned earlier, the proposed system has an admin login, with the accountant serving as the admin. It is a web-based system that requires an internet connection to function. To prevent over- ordering, the system displays the expiry date of the stock. Expired stock can be disposed of by burning the medicine.

Over- ordering can lead to a quick run-out of stock, which may result in losses for the company and waiting for the next shipment for months. The proposed system generates reports that can be saved as PDF files and converted into Excel files using a software called PDF Converter. Additionally, the system prevents sales representatives from dealing with the stock orders from the pharmacy.

2.2.1. Benefits of the Proposed System

The proposed medical inventory management system offers several benefits to healthcare providers:

Improved efficiency: The use of barcode scanning technology will streamline the inventory management process, reducing the time and effort required to manage the inventory.

Reduced waste: By tracking expiration dates and usage rates, the system will help healthcare providers avoid overstocking and reduce the risk of items expiring before they can be used.

Cost savings: The system will enable healthcare providers to optimize their inventory levels, reducing the need for emergency orders and the minimizing the risk of stockouts.

2.2.2. Conclusion

In conclusion, the proposed medical inventory management system offers a comprehensive solution for healthcare providers looking to streamline their inventory management processes. By utilizing barcode scanning technology and an automated database, the system will help healthcare providers optimize their resources, reduce waste, and improve patient care. The system can be customized to meet the specific needs of different healthcare facilities, making it a flexible and adaptable solution for medical inventory management.

2.3. OPEN PROBLEMS IN EXISTING SYSTEM

- No direct contact with Company from the customers
- Medical representative makes the excess orders
- Time consumption for the customers when making orders through the phone
- Customers faces time consumption when purchasing the stock themselves
- Medical representative delays to make the orders
- Hand written orders can be lost from Company Accountant

3. Requirement Analysis

3.1. SOFTWARE REQUIREMENTS SPECIFICATION DOCUMENT

JAVASCRIPT : JavaScript is scripting language that enables you to create dynamically updating content , control multimedia , animate images , pretty much everything else.

CSS : CSS (Cascading Style Sheets) is used to style and layout web pages, for Example, to alter the font, color, size, and spacing of your content, split it Into multiple columns, or add animations and other decorative features.

PHP : PHP (Hypertext Preprocessor) is the most widely used open source and General purpose server side scripting language used mainly in web Development to create dynamic websites and applications.

HTML : HTML (Hypertext Markup Language) is the code that is used to structure a web page and its content.

SQL : SQL is used to communicate with a database. It is the standard language for Relational database management systems. SQL statements are used to Perform tasks such as update data on a database, or retrieve data from a database.

3.2. Hardware Requirements

Hardware Minimum Requirement:

Disk space - 32 GB or more, 10 GB or more for Foundation Edition

Windows 7 or More

Processor – 1.4 GHz 64 Bit

Memory – 1 Gb

3.3. Software Requirements

Visual Studio Code Visual Studio Code (VS Code) is a free and open-source source code editor developed by Microsoft. It is widely used by developers for various programming languages such as JavaScript, Python, and C#. It comes with many built-in features such as debugging, syntax highlighting, code completion, and Git integration. It also supports a wide range of extensions that can be installed from the VS Code Marketplace, making it highly customizable to meet the needs of individual developers.

XAMPP

XAMPP is a free and open-source cross-platform web server solution stack that includes Apache, MySQL, PHP, and Perl. It is commonly used by web developers to create and test dynamic web applications locally on their computers before deploying them to a live web server. It is compatible with Windows, Linux, and Mac OS, making it a popular choice among developers of all platforms. XAMPP is an ideal tool for web developers looking for a quick and easy way to set up a local web server environment.

MailTrap

Mailtrap is a cloud-based email testing tool that allows developers and QA teams to test and preview emails in a safe and controlled environment. It intercepts emails sent from development or staging environments and routes them to a private inbox within Mailtrap, preventing them from being sent to real users. This ensures that developers can test their email templates and content without accidentally sending emails to real users.

4. StockMeds Management System

Medistock, is an advanced web-based system that provides real-time visibility into inventory levels, automatically generates reorder alerts, and tracks expiration dates. Medistock also offers an intuitive user interface and reporting capabilities, making it easy to use and efficient. Compared to the existing systems, Medistock provides a comprehensive and reliable solution for managing medical inventory, reducing waste, and improving patient care. With its advanced features and capabilities, Medistock is the clear choice for healthcare facilities looking to streamline their inventory management 29 Processes and maximize their resources. Cloud-based: Unlike some existing inventory management systems that may be installed on local machines or servers, present Medi stock is a cloud-based system. This means that healthcare providers can access the system from anywhere, as long as they have an internet connection.

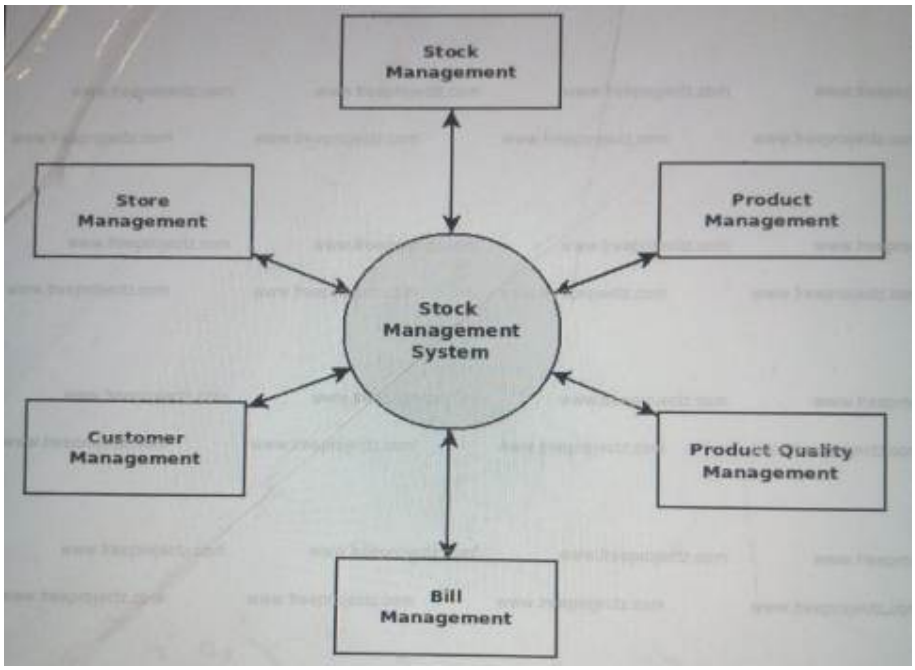

Fig:- MediStock Management System

Integration: Present Medi stock is designed to integrate with other systems used in healthcare, such as electronic health records (EHRs) and billing systems. This integration can help streamline workflows and improve accuracy.

Customization: Present Medi stock offers customization options that allow healthcare providers to tailor the system to their specific needs. For example, providers can customize the system to track supplies for specific departments or locations.

Analytics: Present Medi stock includes data analytics capabilities that can provide insights into usage patterns, cost savings, and more. These analytics can help healthcare providers make data-driven decisions about inventory management.

Security: Present Medi stock has robust security features designed to meet data security and compliance requirements in the healthcare industry. This can provide peace of mind for healthcare providers and patients.

5. Architecture

Administrator will log into the system by using the preset username and password. After entering the login details, administrator will be redirected to the homepage. Administrator have to choose the following menu Add Stock, Update Stock, Update Quantity and View Pharmacists' Orders in a homepage. When the administrator choose Add Stock, he or she have to enter the medicine details then after entering the details stock will be added to the database. Administrator can confirm whether the stock is added or not when he or she is redirected to the 31 view stock page after entering the stock details. When the administrator choose Update Stock, he or she will be redirected to select the medicine, after selecting the medicine, the administrator will be redirected to enter the updatable details of medicine.

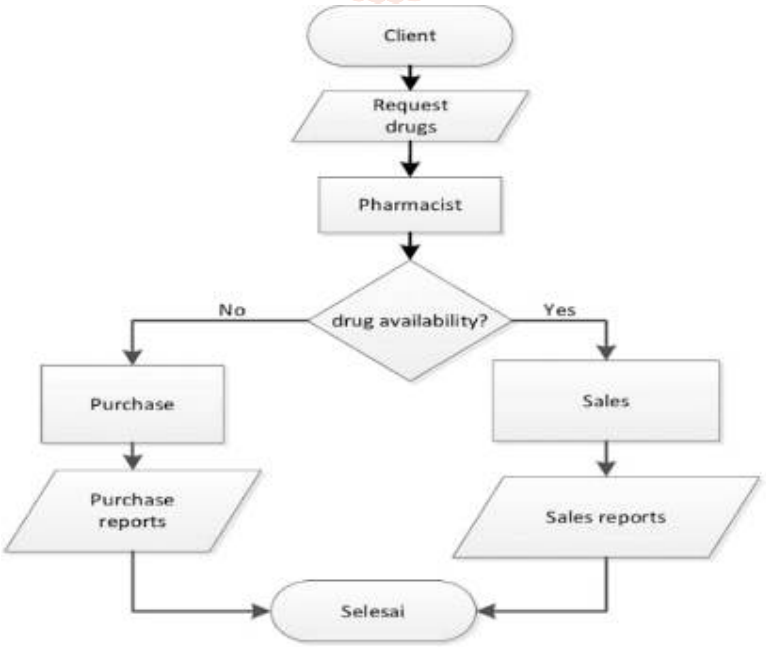

Fig:-Architecture of StockMeds

After submit the details, the stock will be updated and the administrator can confirm whether the stock is updated or not by looking at the view stock page after being redirected from the update stock page. When the administrator choose Update Quantity, he or she will be redirected to select the medicine after selecting the medicine administrator will have to enter the quantity of medicine when the new consignment of the same medicine arrives. After submitting the details, the quantity will updated in the database. Administrator can confirm whether the quantity is added or not by looking at the view stock page when the administrator is redirected from the Update Quantity page. When the Administrator choose View Pharmacists' page he or see the orders of the medicines. The system architecture for Medistock is based on a three-tier architecture, consisting of a presentation layer, application layer, and data layer. The presentation layer is the user interface, which is designed to be intuitive and user friendly, allowing users to easily navigate and interact with the system. The application layer is the business logic layer, where the core functionalities of the system are implemented. This layer includes modules for inventory management, order tracking, expiration management, and reporting. The data layer is the database, where all the system data is stored, including inventory levels, orders, shipments, and expiration dates. Medistock is built using web technologies, making it easily accessible from anywhere with an internet connection.

6. Data Set

1. **Item Name:** The name of the medical item in the inventory, such as syringes, bandages, or medication.
2. **Item ID:** A unique identifier for each item in the inventory.
3. **Manufacturer:** The name of the company that produces the item.
4. **Quantity on Hand:** The number of items currently in stock.
5. **Minimum Stock Level:** The minimum number of items required to ensure that the inventory level does not fall below a critical level.
6. **Maximum Stock Level**: The maximum number of items that can be stored in the inventory.
7. **Reorder Point:** The inventory level at which an order for additional items should be placed.
8. **Cost per Item:** The cost of purchasing each item from the manufacturer.
9. **Supplier:** The name of the company that supplies the items.
10. **Lead Time:** The time it takes for a supplier to deliver items after an order is placed.
11. **Expiration Date:** The date after which the item should not be used due to its decreased effectiveness or safety.
12. **Location in Inventory:** The physical location of the item in the inventory.
13. **Usage Rate:** The rate at which items are used in the healthcare facility.

7. Methodology

Implementing a successful medical inventory management system involves several key steps. The first step is to identify the inventory needs of the healthcare facility by reviewing past inventory usage and tracking trends in patient needs. Once the inventory needs are identified, appropriate data collection methods should be selected, such as manual or automated methods through barcode scanners technology. The next step is to select and set up an inventory management software that meets the needs of the healthcare facility. This includes inputting all relevant data into the system and configuring it to track inventory levels and generate alerts when inventory 37 levels fall below a certain threshold. Once the inventory management system is set up, inventory control policies should be established, including setting minimum and maximum inventory levels, determining reorder points, and establishing procedures for inventory counting and auditing. Staff training should also be provided to ensure that staff members know how to use the system and follow inventory control policies.

8. Algorithm used

There are various algorithms that can be used in medical inventory management systems to optimize inventory control and improve patient care. Some of the commonly used algorithms are:

8.1. Economic Order Quantity (EOQ): This algorithm calculates the optimal order quantity for a specific item by considering factors such as item cost, ordering cost, and carrying cost. The goal is to minimize inventory costs while ensuring that enough items are available to meet demand.

8.2. Just-In-Time (JIT): This algorithm aims to minimize inventory levels by ensuring that items are delivered just in time to meet demand. JIT relies on accurate demand forecasting and efficient supply chain management to minimize inventory costs while ensuring that items are available when needed.

8.3. Minimum/Maximum (Min/Max) Inventory Control: This algorithm sets minimum and maximum inventory levels for each item in the inventory. When inventory levels fall below the minimum level, an order is placed to bring inventory levels back up to the maximum level. This algorithm ensures that inventory levels are always within a desired range, minimizing the risk of stock outs while also minimizing inventory costs.

8.4. Reorder Point (ROP): This algorithm calculates the inventory level at which an order should be placed to ensure that inventory levels do not fall below a critical level. The ROP takes into account factors such as lead time, usage rate, and safety stock to ensure that items are always available when needed.

8.5. Inventory Optimization: This algorithm uses advanced data analytics techniques such as machine learning and artificial intelligence to optimize inventory levels and improve demand forecasting. By analysing historical data and real-time inventory data, inventory optimization algorithms can predict future demand and adjust inventory levels accordingly.

9. Result

> The resultant Webpage

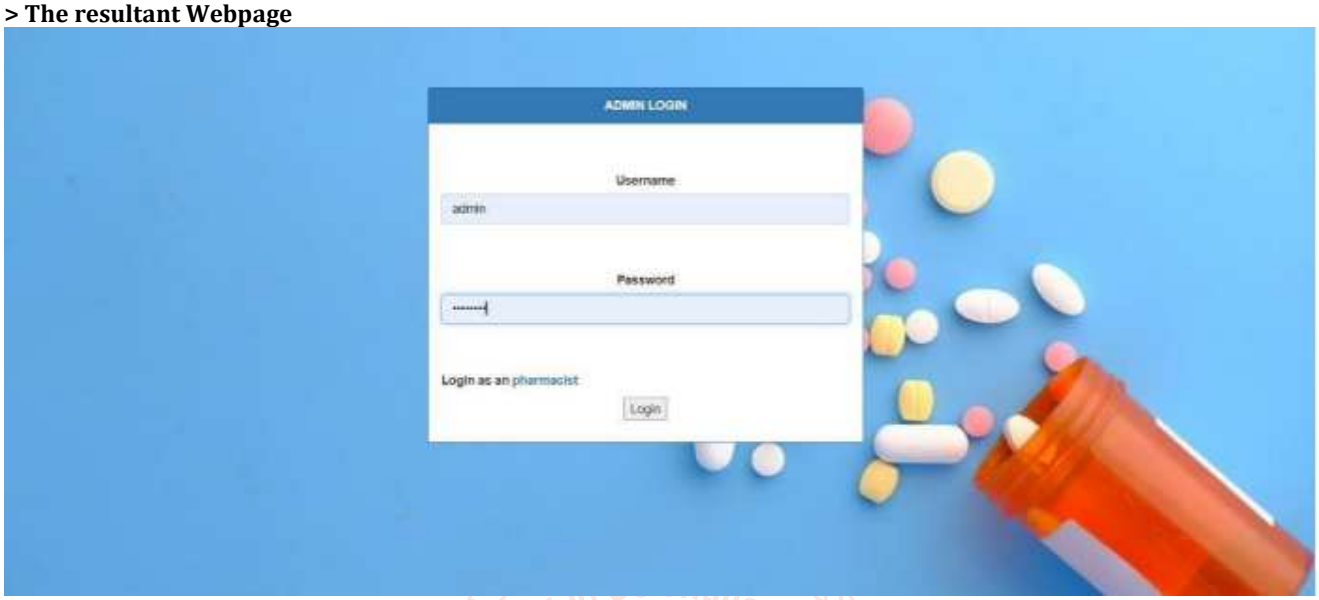

Fig.9.1:- The Resultant Webpage

> Xampp control panel

Fig.9.2:- Xampp Control Panel

>The Admin panel

Fig.9.3:- Admin Panel

> The pharmacist panel

Fig.9.4:- Pharmacist Panel

>The expired medicine email

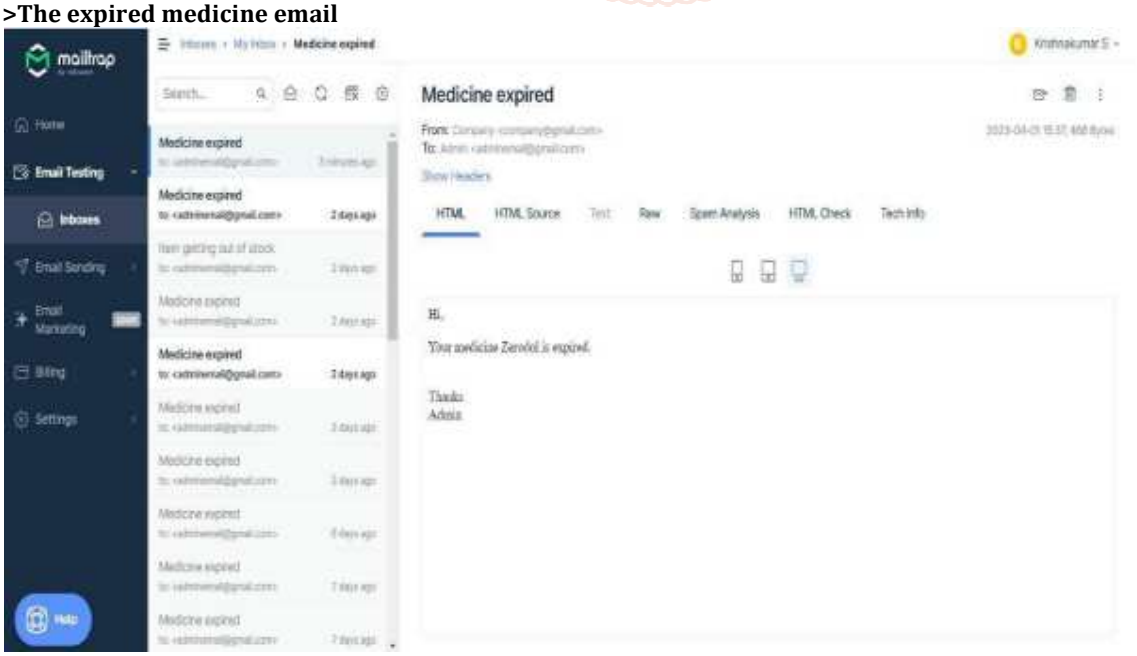

Fig.9.5:- Expiry Email

>Email regarding the out of stock of medicine

Fig.9.6:- Out of Stock Email

Medical inventory management systems are software tools designed to streamline the process of managing medical supplies and equipment. These systems can help healthcare providers improve their inventory control and reduce waste, while ensuring that they always have the supplies they need to provide quality care to their patients.

One of the main benefits of a medical inventory management system is that it can help healthcare providers avoid stockouts or overstocking of medical supplies. This is particularly important in healthcare settings where supplies can be expensive or have a limited shelf life. By accurately tracking inventory levels and automatically generating purchase orders, these systems can help providers optimize their inventory levels and reduce the risk of waste.

10. Conclusion

The project has successfully achieved all the objectives, user requirements and aims set forth in the introduction. In order to enhance the project, future work will focus on implementing a secure online payment system and a secure website. If more time were available, it would have been possible to include a profile picture and details of the pharmacist. The project has enabled the development of knowledge in areas such as displaying or populating data on a form, reducing stock quantities and making use of user sessions. The proposed system (MediStock) may be demonstrated to pharmacists and company staff, and once their satisfaction is obtained, the system will be deployed to a real environment by hosting it on Google Cloud Platform and making it searchable.

A medical inventory management system is essential for healthcare facilities to operate efficiently and effectively. The system ensures that medical supplies are available in adequate quantities, at the right time, and at the right place. By implementing an inventory management system, healthcare providers can streamline their processes, reduce waste, and ultimately provide better patient care.

The system should be designed to include features such as automated inventory tracking, real-time data reporting, and supply chain management. It should also be user-friendly, accessible, and secure.

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