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Medication Donation Center Locator with Category-Based Guidelines and Timings

Gajula Naveen, G. Arpitha*
Vaagdevi Engineering College, Warangal, 506005, Telangana, India.
*Correspondence: G. Arpitha

Abstract
Medication wastage is a growing concern in the healthcare sector, while many individuals and communities continue to face limited access to essential medicines. The system is a web-based application developed to address this imbalance by providing a secure and structured platform for managing medicine donations. The system enables individuals to donate unused or surplus medicines to authorized donation centers, ensuring proper utilization while maintaining safety and compliance standards. The application is built using a React.js frontend for an interactive and user-friendly interface, combined with a Django Representational State Transfer Application (REST) backend that handles secure data processing and business logic. A My Structured Query Language (MySQL) database is used for reliable storage of user information, donation center details, categories, and operational status. The system follows a role-based architecture with controlled access for administrators and users. Users must complete a registration process and receive admin approval before gaining access, ensuring authenticity and preventing misuse. Administrators are provided with a centralized dashboard to approve users, add and manage donation centers, define accepted medication categories, control donation timings, and enable or disable centers as required. Users can view only active and approved donation centers along with location details, contact information, donation categories, and operational timings. The category-based organization and timing control help ensure that medicines are donated safely and at appropriate locations. The system promotes responsible medicine donation, reduces medical waste, improves accessibility to essential drugs, and supports community healthcare efforts through a controlled, transparent, and technology-driven approach.

Keywords: Medication Donation, Medicine Donation Centers, Healthcare Management, Category-Based Guidelines, Donation Timings, React.js, Django REST Framework, MySQL.

1. Introduction

The improper disposal of unused medicines poses a significant risk to public health. Accumulating these medicines in homes increases the risk of accidental poisoning or deliberate misuse, potentially leading to suicide [1]. Therefore, it is essential to both reduce the generation of unused medicines and ensure their safe and appropriate disposal. This public health issue demands serious attention and responsible action [2]. Drug donation represents a viable method for the disposal of medications, effectively redirecting unused drugs to where they are needed most [3]. Drug donation practices are used for a variety of reasons, ranging from providing emergency relief to sustaining long-term medicinal supplies or even for recycling drugs. A common scenario is the donation of leftover medications nearing their expiry date, which often occurs when clinics purchase more than they need. Although the origins and intentions behind drug donations may differ, they are all guided by a set of universal basic guidelines, ensuring that these donations are handled responsibly and effectively. This approach helps to maximize the benefits of drug donations while minimizing potential risks [4]. The accumulation of unused medicines in patients' homes has prompted charitable

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organizations to step in, collecting and redistributing these medications before they expire as a way to reduce waste and ensure their proper use [5].

Drug donations, often provided free of charge, are supplied to various countries by individuals, organizations, and non-governmental organizations (NGOs) [6]. In any medical practice, improperly managed donations can create more burdens than benefits for the intended recipient governments. The World Health Organization (WHO) published its first guidelines for drug donations in 1996, with contributions from various parties, including United Nations agencies, international humanitarian relief organizations, and others [7]. In 2010, the third and final edition of the Medical Donations Guidelines was issued, featuring twelve best-practice recommendations for both donor and recipient countries. These recommendations specify that donations should meet the recipient country's specific needs, align with its disease patterns, and be in agreed quantities.

Donated medicines should be approved for use in the recipient country, listed on its national list of essential medicines or standard treatment guidelines, and similar to those commonly used there. They must originate from a quality-assured source and meet quality standards [8]. In Saudi Arabia, the situation of drug donations is unique and warrants specific attention since the awareness and perception of community practices regarding drug donations represent an area lacking regulation and specific policy guidance. This study aims to thoroughly survey and assess the current practices and community perceptions of drug donations within Saudi Arabia, evaluating their alignment with international norms and identifying unique local challenges.

2. Literature Survey

Kashiya et al. [9] designed a web application to set up an online platform for collecting unused medications that could then be distributed to those in need. This work concentrated on gathering unused medications from patients who had fully recovered from their illnesses and no longer required them. The collected medications were then made available to individuals and organizations, who could either use them for their own medical needs or donate them further. By properly utilizing unused medications, this approach helped reduce the cost of providing national health services and enabled individuals who could not afford these medicines to receive better medical care. Nyirenda and Mupeta [10] proposed the design and development of a web-based application aimed at helping users efficiently locate nearby pharmacies. This research involved comprehensive data gathering and analysis of pharmacy locations, services provided, operating hours, and contact information. The collected data were systematically integrated into a user-friendly web application that offered advanced search capabilities. Users were able to locate pharmacies based on criteria such as proximity, service type, operational status, and distance. The application featured a streamlined interface and ensured a responsive experience across multiple devices.

Abuassonon et al. [11] studied the awareness of residents of Jeddah regarding proper medication disposal and demonstrated that only a moderate percentage of inhabitants knew how to dispose of medications correctly. The study highlighted that Romania had no established schemes for returning unused pharmaceuticals, and pharmacies were not legally obliged to accept expired or unused medicines. Although the National Public Health Institute managed pharmaceutical waste information at a national level, guidelines for safe disposal at pharmacies were limited. Rogowska et al. [12] aimed to show

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that improper handling of unused or expired drugs was a significant issue within waste management systems and negatively affected the environment. Their review of forty-eight scientific articles published between 2012 and 2021 revealed that the most common disposal methods were household waste disposal or flushing medicines into sewage systems. This practice persisted even in countries with drug return programs, indicating insufficient system effectiveness, often due to inadequate public education.

Alhomoud et al. [13] (2021) reported that undergraduate and postgraduate pharmacy students indicated pharmacies as the best location for returning unused medications, with 67% agreement. Respondents also identified the Food and Drug Administration and pharmaceutical companies as primary authorities responsible for safe medication disposal, followed by pharmacies. Toma et al. [14] described a system in which wholesale distributors were responsible for delivering empty containers to pharmacies and collecting filled containers, while pharmacies collected unused medicines from patients free of charge. The disposal of medical waste was financed by Cyclamed through contributions from pharmaceutical companies. Tabash et al. [15] (2016) assessed the impact of an educational program on the knowledge, attitude, and practices of healthcare staff regarding pharmaceutical waste management. The study, conducted across five governmental hospitals in Gaza, revealed significant improvements after program implementation, with knowledge and practice levels increasing from 50% to 75%. Naser et al. [16] (2020) found that Jordanian respondents believed drug waste reduction could best be achieved by dispensing medications only as needed, prescribing medicines rationally, and providing appropriate advice to consumers. Smale et al. [17] emphasized that various stakeholders could effectively contribute to preventing medication waste. They highlighted the importance of increasing patient awareness to encourage responsible medication ordering and participation in waste-reduction initiatives. Many countries had established medication take-back systems to mitigate waste severity.

3. Proposed Methodology

This research presents a structured digital solution designed to support the safe and responsible redistribution of unused data as shown in Figure 1 medicines through authorized centers. The study emphasizes controlled user participation by allowing access only after verification, ensuring trust and preventing misuse. A centralized administrative layer manages approvals, data validation, and system operations, which strengthens reliability and accountability. Users are provided with real-time access to verified donation locations along with essential details such as operating hours and accepted categories. The system supports dynamic updates so that information remains accurate and current at all times. By integrating role-based access with a responsive web interface, the study demonstrates an efficient approach to improving healthcare resource utilization while minimizing wastage.

User Interface (Web Browser – React): The user interacts with the system through a browser-based graphical interface that provides simple and intuitive navigation. Features such as registration, login, profile viewing, and donation centre browsing are designed for ease of use. Admin users access additional controls for approvals and centre management through the same interface. Every user action is translated into secure Hyper Text Transfer Protocol (HTTP) requests and sent to the backend for processing.

Backend Server (Django REST Framework): The backend server acts as the central control unit that processes all incoming requests from the user

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interface. It handles authentication, role validation, approval checks, and routing of requests to the appropriate services. Core application logic, including permission enforcement and data validation, is executed at this level. This layer ensures smooth coordination between the frontend and the database.

Database Layer (MySQL): The database layer is responsible for storing and managing all persistent information used by the system. It maintains structured records of users, roles, approval status, donation centers, and operational details. Efficient queries allow fast retrieval and updates while preserving data integrity. This layer ensures reliable storage and consistency across all system operations.

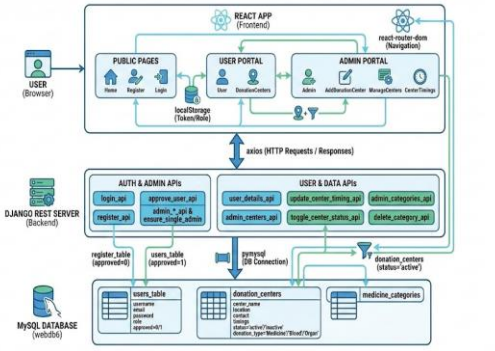

Figure. 1: Proposed System Architecture of MDCL

User Registration and Approval Flow: When a user submits registration details, the information is validated and securely stored with a pending approval status. This prevents immediate access and ensures that only verified participants can interact with the system. An administrator reviews the registration details and approves legitimate users. Once approved, the user gains access to authorized functionalities.

Donation Centre Management Module (Admin Controlled): Administrators can register new donation centers by providing essential details such as location, contact information, timings, and donation type. The system allows admins to enable or disable centers based on availability or compliance requirements. Timings and status updates can be modified dynamically without affecting system performance. These administrative controls ensure accuracy and operational flexibility.

Donation Centre Access Module (User View): Approved users are presented with a list of active and authorized donation centers only. Each listing displays clear and relevant information to help users make informed decisions. Filtering ensures that inactive or unavailable centers are not shown. This approach enhances trust and improves user experience.

End-to-End Operational Flow: All user actions follow a structured pipeline from the interface to the backend and database layers. Requests are validated, processed, and stored using secure and efficient mechanisms. Role-based access ensures that users interact only with permitted features. The system functions as an integrated workflow that supports reliability, transparency, and real-time updates.

3.2 Proposed Workflow

The workflow of the system as show as Figure 2 to defines a clear and structured sequence of operations that governs how users and administrators interact with the application. It begins with user actions initiated through the web interface and progresses through secure backend processing and data validation. Each request follows a predefined path that ensures role-based access, approval checks, and controlled data flow. Administrative actions such as user verification and center management directly influence the information available to users. Real-time communication between the interface, server, and database keeps the system always synchronized. This organized workflow ensures reliability, security, and smooth operation across all functional stages.

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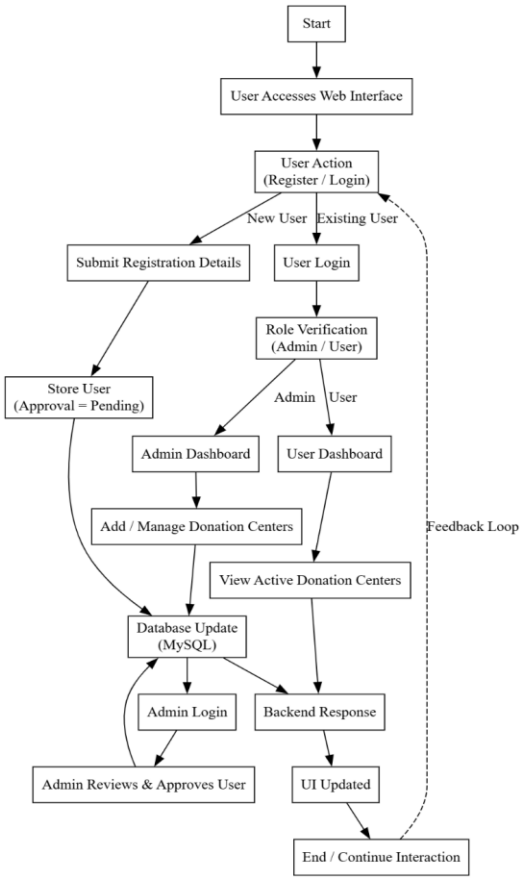

Figure. 2: Workflow of MDCL.

User Access and Interface Interaction: The workflow begins when a user accesses the system through a web browser. The user interacts with a responsive graphical interface where options such as registration, login, and navigation are provided. All interactions are handled dynamically without page reloads, ensuring a smooth user experience. Each action performed by the user is prepared as an HTTP request.

User Registration Process: A new user submits personal details including username, email, mobile number, and address through the registration form. These details are validated at the backend and stored securely in the database with a pending approval status. The user is informed that access will be granted only after verification. This step ensures controlled and trustworthy participation.

Admin Approval Workflow: The administrator logs into the system and views the list of newly registered users awaiting approval. Each user's details are reviewed to confirm authenticity. Upon approval, the user's account status is updated in the database. This step acts as a security checkpoint before allowing system access.

Login and Role Validation: Once approved, the user logs in using valid credentials. The backend verifies login details and determines the user role (admin or user). Based on the role, the system redirects the user to the appropriate dashboard. Unauthorized or unapproved login attempts are blocked at this stage.

Admin Donation Centre Management: The administrator manages donation centers by adding new centers with required details such as location, contact information, donation type, and timings. The admin can enable or disable centers based on availability. Timings and operational status can be updated dynamically. These changes are instantly reflected across the system.

User Donation Centre Access: Approved users can view only active and authorized donation centers. The system displays center details including address, contact number, operating hours, and accepted categories. Inactive or disabled centers are filtered out automatically. This ensures users receive reliable and up-to-date information.

Real-Time Data Synchronization: Every action performed by users or administrators is processed through REST Application Programming Interface (API)s. The backend validates requests, updates the database, and returns responses to the frontend. React updates the interface dynamically based on the response data. This maintains real-time synchronization between system components.

Continuous Interaction and Updates: The workflow operates in a continuous loop where

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users can repeatedly access information and admins can manage data. Any update made by the admin is immediately available to users. The system maintains consistency, accuracy, and security throughout all operations.

4. Results description

The results obtained from the MDCL demonstrate the effectiveness of integrating intelligent location-based services with medicine categorization and donation management. The system accurately identifies suitable donation centers while providing category-specific donation guidelines and operational timings to users. Experimental evaluation indicates improved accessibility, reduced medicine wastage, and enhanced efficiency in the donation process compared to conventional approaches. The implemented framework also ensures better user convenience by simplifying the search and verification process for eligible medicines and nearby donation centers. The proposed MDCL system contributes to promoting safe medication reuse practices, supporting healthcare accessibility, and encouraging responsible pharmaceutical waste management.

Figure 3 provides a centralized control interface for managing and monitoring the activities. This page displays key summary information such as the total number of registered users and the number of medication donation records or registered donation centers, enabling the administrator to quickly assess system usage and activity levels. Through the dashboard and its navigation options, the admin can review and approve newly registered users, manage donation-related data, and oversee platform operations. The dashboard plays a crucial role in enforcing administrative control, maintaining system integrity, and ensuring the secure and organized functioning of the medication donation platform.

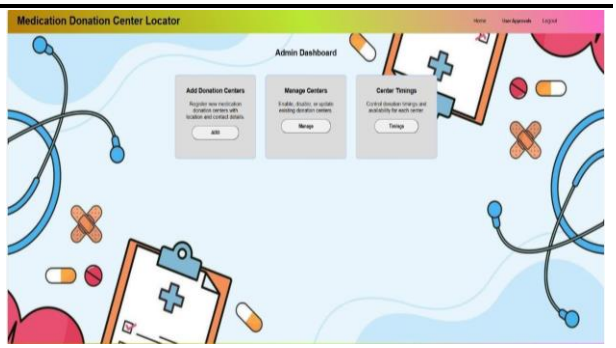

Figure. 3: Admin dashboard.

Figure 4 allows the administrator to register and manage new medication donation centers. This page provides a structured form to enter essential details such as the center name, location, contact information, operating hours, and accepted medication categories. By adding verified donation center information, the administrator ensures that users have access to accurate and reliable options for medication donation. This functionality supports organized data management, maintains platform authenticity, and enhances the efficiency of the medication donation process.

Figure. 4: Add donation center page.

Figure 5 allows the administrator to register new blood donation centers by entering essential details such as center name, location, contact number, donation timings, and accepted blood groups. The form ensures structured data entry for accurate record creation in the system. Upon successful submission, the center details are stored securely and made available for management and display based on approval

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status. This page supports efficient expansion and regulation of blood donation services within the platform.

Figure 6 allows the administrator to view and control all registered donation centers in a single tabular interface. It displays key details such as center name, donation type, location, contact information, timings, and current status. The administrator can enable or disable centers to regulate their availability to users. This page ensures effective monitoring, operational control, and maintenance of authorized donation centers within the system.

Figure. 5: Add blood donation center page.

Figure. 6: Admin manages donation centers.

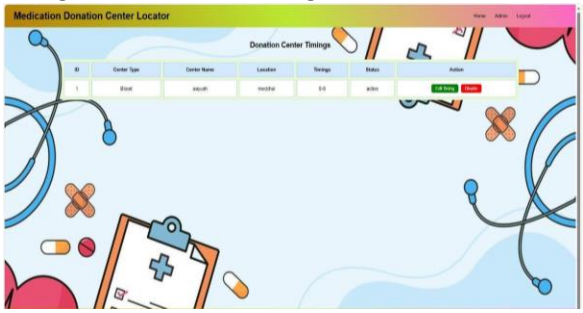

Figure. 7: Donation center timings page.

Figure 7 allows the administrator to define and manage the operating hours of registered medication donation centers. This page provides a structured interface to specify opening and closing times, working days, and availability schedules for each donation center. By maintaining accurate and updated timing information, the administrator ensures that users can plan their visits effectively and avoid inconvenience. This functionality improves accessibility, enhances user experience, and supports the smooth and efficient operation of the medication donation process.

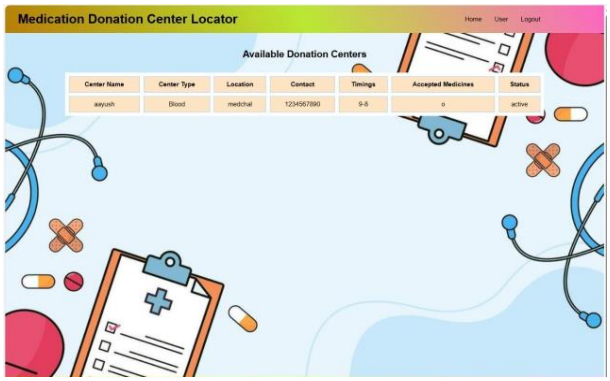

Figure. 8: Available donation center page.

Figure 8 provides users with a list of authorized medication donation centers registered. This page displays essential details such as the center name, location, contact information, operating hours, and accepted medication categories, allowing users to make informed donation decisions. By presenting verified and up-to-date information, the page helps users easily identify suitable donation centers near them. This functionality supports safe and efficient medication donation, enhances transparency, and contributes to a reliable and user-friendly donation experience

5. Conclusion

This research successfully addresses the challenges of unorganized and inefficient medication donation practices through a secure, web-based solution. The system integrates role-based access, admin-controlled approval,

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donation center management, category guidelines, and timing control into a single platform. By automating user registration, verification, and center operations, the system significantly reduces manual effort and improves data accuracy. The use of a modular React–Django–MySQL architecture ensures smooth interaction between frontend and backend components. Performance improvements are observed in faster data retrieval, real-time updates of donation center status, and quick response to user actions such as login and center listing. Optimized database queries and RESTful APIs enhance system responsiveness even with multiple concurrent users. The centralized dashboard enables administrators to efficiently manage users and centers, reducing operational delays. Users benefit from clear visibility of active centers, acceptable medicine categories, and authorized donation timings. Secure communication using CORS and role-based controls strengthens data protection and system reliability. The system improves transparency, minimizes medicine wastage, enhances accessibility to essential drugs, and provides a scalable foundation for organized healthcare donation management.

References

[1] Tong, A.Y.C.; Peake, B.M.; Braund, R. Disposal practices for unused medications around the world. Environ. Int. 2018, 37, 292–298.

[2] Mackridge, A.J.; Marriott, J.F. Returned medicines: Waste or a wasted opportunity? J. Public Health 2017, 29, 258–262.

[3] Toh, M.R.; Chew, L. Turning waste medicines to cost savings: A pilot study on the feasibility of medication recycling as a solution to drug wastage. Palliat. Med. 2017, 31, 35–41.

[4] Bero, L.; Carson, B.; Moller, H.; Hill, S. To give is better than to receive: Compliance with WHO guidelines for drug donations during 2000–2008. Bull. World Health Organ. 2018, 88, 922–929.

[5] West, L.M.; Diack, L.; Cordina, M.; Stewart, D. A systematic review of the literature on “medication wastage”: An exploration of causative factors and effect of interventions. Int. J. Clin. Pharm. 2019, 36, 873–881.

[6] Braund, R.; Peake, B.M.; Shieffelbien, L. Disposal practices for unused medications in New Zealand. Environ. Int. 2019, 35, 952–955.

[7] Hogerzeil, H.V.; Couper, M.R.; Gray, R. Guidelines for drug donations. BMJ Br. Med. J. 2019, 314, 737.

[8] Permaul Flores, H.; Kohler, J.C.; Dimancesco, D.; Wong, A.; Lexchin, J. Medicine donations: A review of policies and practices. Glob. Health 2023, 19, 67.

[9] B. Kashiya, J. Joshi, Y. Ramteke, “Web Based Application for Unused Medicine Donation MedDonate”, International Journal of Research Publication and Reviews, Vol. 4, No. 4, pp. 5637-5646, 2023.

[10] L. Nyirenda1and M. Mupeta, “Design and Development of a Web Based Application Pharmacy Finder”, International Journal of Advances in Scientific Research and Engineering, Vol. 11, No. 6, pp. 1-7, 2025.

[11] Abuassonon, A.A.; Kalkatawi, B.S.; Alzahrani, L.S.; Eid, B.G.; Neamatallah, T.A. Practices of Jeddah Residents Regarding the Disposal of Unused and Expired Medications: A Community-Based Survey. JKAU Med. Sci. 2019, 26, 35–44.

American Journal of
AI Digital Transformation and Regenerative Pharmacist
Peer Reviewed, Referred & Indexed Journal
ISSN: 3070-0418 www.zesterapublications.com Original Research Paper

[12] Rogowska J, Zimmermann A. Household Pharmaceutical Waste Disposal as a Global Problem—A Review. International Journal of Environmental Research and Public Health. 2022; 19(23):15798.

[13] Abahussain, E.; Waheedi, M.; Koshy, S. Pharmacy students' knowledge and practices concerning the storing and disposal of household medication in Saudi Arabia. Curr. Pharm. Teach. Learn. 2021, 13, 5–13.

[14] Toma, A.; Crişan, O. Regulations on green pharmacy in European countries–a comparative study. Farmacia 2021, 62, 182–188.

[15] Tabash, M.I.; Hussein, R.A.; Mahmoud, A.H.; El-Borgy, M.D.; Abu-Hamad, B.A. Impact of an intervention programme on knowledge, attitude and practice of healthcare staff regarding pharmaceutical waste management, Gaza, Palestine. Public Health 2016, 138, 127–137.

[16] Naser, A.Y.; Amara, N.; Dagash, A.; Naddaf, A. Medications disposal and medications storage in Jordan: A cross-sectional study. Int. J. Clin. Pract. 2021, 75, e13822.

[17] Smale, E.M.; Egberts, T.C.G.; Heerdink, E.R.; van den Bemt, B.J.F.; Bekker, C.L. Waste-minimising measures to achieve sustainable supply and use of medication. Sustain. Chem. Pharm. 2021, 20, 100400.