



Hospital Operations Automation through Porter's Management Application

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ABSTRACT: In modern hospitals, efficient patient care and smooth workflow are essential for delivering high-quality healthcare services. Traditional manual methods of managing porters often result in inefficiencies, delays, and miscommunication, which can directly impact patient outcomes and staff productivity. Porter Management Application (PMA) is designed to streamline and optimize the allocation and coordination of porters in hospitals. It helps in hospital operations automations. The PMA empowers hospital staff to manage porter resources effectively, leading to improved patient care, reduced waiting times, and optimized resource utilization. Moreover, the application's data-driven approach enables continuous improvement and better decision-making, ultimately enhancing the overall hospital experience for patients, staff, and visitors alike.

KEYWORDS: Hospital Operations, Porter Management Application, Automation

I. INTRODUCTION

Hospital porters are staff members who work in hospitals and are responsible for transporting patients, equipment, supplies, and other items throughout the hospital. They are typically the backbone of hospital logistics and play a critical role in the effective functioning of healthcare services.

Hospital porters perform a range of duties that are essential to the smooth running of hospital operations. In addition to transporting patients and equipment, they may be responsible for cleaning and maintaining hospital areas, responding to emergency situations, and working closely with hospital staff to ensure that patients are transported safely and efficiently. Overall, hospital porters play an important role in the healthcare system and contribute to the delivery of high-quality care to patients.

II. REVIEW OF LITERATURE

- [1]. Mobile health tools enable clinicians and researchers to monitor the type, quantity, and quality of everyday activities of patients and trial participants.
- [2]. Suggested a modelling approach that extends the Analysis Specification Conception and Implementation (ASCI) methodology based on Porter's and SCOR models to understand the necessity of defining an appropriate system of performance metrics that should be defined in accordance with the hospital value system.
- [3]. It is a doctoral thesis where author focuses on autonomous material transportation and its role in hospital intralogistics.
- [4]. The paper summarizes the lessons of multi-institutional/multi-disciplinary team that has learned by conducting a range of mHealth projects using mobile phones with diverse clinical populations.
- [5]. This study aims to examine the feasibility of using smartphones to collect personal-level time-activity data.
- [6]. In this study authors design an efficient logistics system (central sterile services, materials management, food, pharmacy, linen), develop robust Robotic Process Automation (RPA) solutions.
- [7]. In this paper, authors emphasized the need for automated transportation systems for hospitals. Among other alternatives, mobile robots are the most prominent means of automation of transportation tasks in hospitals. Their analysis also shows that most of the existing transportation is carried out manually, whereas hospitals can greatly benefit from automated transportation.
- [8]. Since the healthcare service industry must take into account its high customization needs, authors suggested that there are positive steps to make the hospital structure itself more patient friendly and quality related; hence



improving its health-marketing strategies to the general public.

III. PORTERS MANAGEMENT APPLICATION

Hospital internal porter's management application is a software tool that can be used by hospitals to manage their internal transportation operations. This type of application can help hospitals to optimize their porter (transport) services, track the movement of patients, equipment and supplies, and improve the overall efficiency of their healthcare delivery system. Some of the key features of a hospital internal porter's management application include:

- **Task assignment and scheduling:** The application can be used to assign tasks to porters and schedule their workloads. This ensures that there are enough porters available to move patients, equipment and supplies throughout the hospital.
- **Real-time tracking:** The application can provide real-time tracking of the movement of patients, equipment, and supplies, allowing hospital staff to monitor the status of these items and respond quickly to any issues or delays.
- **Route optimization:** The application can use algorithms to determine the most efficient routes for transporting patients, equipment, and supplies, taking into account factors such as distance, traffic, and urgency.
- **Reporting and analytics:** The application can generate reports and analytics on the performance of the porter services, helping hospital management to identify areas for improvement and make data-driven decisions.

IV. NEED FOR THE STUDY

Current hospital porter operations are manually driven by over phone requests and floor wise porter assignment at the nursing stations. By automating processes such as task assignment, scheduling, and real time tracking, the application can help hospital porters work more efficiently and reduce patient wait times. The application can also enhance patient safety by providing real-time tracking and analytics that enable hospital staff to monitor patient movements and respond quickly to any issues or delays.

Additionally, a porter management application can help hospital staff focus on higher-

level tasks and improve overall productivity by automating routine tasks such as inventory management and equipment tracking. By reducing the risk of errors or delays, the application can help hospitals save costs and improve their bottom line. The data generated by a porter management application can also provide valuable insights into the performance of healthcare delivery systems, enabling hospital management to identify areas for improvement and make data-driven decisions that can help the hospital operate more efficiently and effectively.

V. OBJECTIVES OF THE STUDY

- To understand the current Porter's management process at the study hospital.
- To study the development and implementation of Porter's management application.
- To compare manual process with Porter's management application.

VI. RESEARCH METHODS

6.1 SCOPE OF THE STUDY

The study is conducted in a corporate hospital in Hyderabad for a period of three months. The scope of the Porter Management Application applies to all the operational activities in the hospital where a porter is required like:

- Transporting patients to and from various areas of the hospital, including surgery, imaging, and outpatient clinics
- Moving medical equipment, supplies, and laboratory specimens throughout the hospital
- Assisting in the cleaning and maintenance of hospital equipment and facilities
- Responding to emergency situations and transporting patients to the emergency department
- Assisting with patient transfers to other hospitals or healthcare facilities
- Collecting and delivering patient meal trays and ensuring patients receive their meals on time
- Assisting with patient admissions and discharges
- Delivering and collecting mail and other materials within the hospital
- Providing general assistance to hospital staff and patients as needed.



6.2 SAMPLING METHOD: The sampling method used in this study is simple random sampling method. The study unit includes Porters, Nursing Staff, Billing Staff, Bio Medical Engineering Team, IT Asset Management Team, Food and Beverages. The sample size for the study comprises the data collected directly from the application post implementation. Primary data is collected by interviewing the users on the current process and creating process flow documents to design the workflow for application.

6.3 DATA ANALYSIS AND PRESENTATION: The collected data is analyzed using tools such as pie charts, bar charts and MS Excel.

6.3.1. NUMBER OF TASKS RAISED UNDER EACH SERVICE

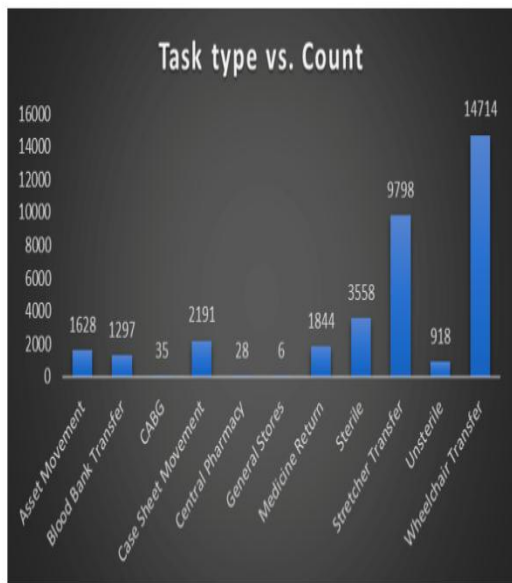


Fig 1 - Number of tasks raised under each service

INTERPRETATION: The data from the Porter Management System used in hospitals reveals a wide spectrum of tasks that users have requested through the platform (Fig 1).

6.3.2. AVERAGE TIME TAKEN FOR THE COMPLETION OF TASKS:

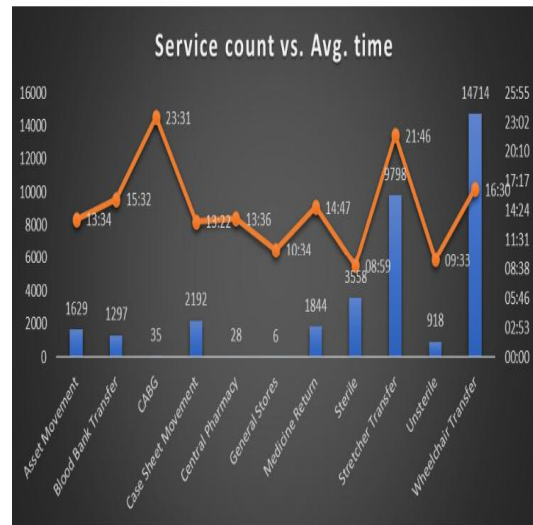


Fig 2- Average time taken for the completion of tasks

INTERPRETATION: Figure 2 presents the average time taken in minutes to complete different services requested through the Porter Management System in hospitals.

6.3.3. COUNT OF NUMBER OF TASKS COMPLETED & CANCELLED:

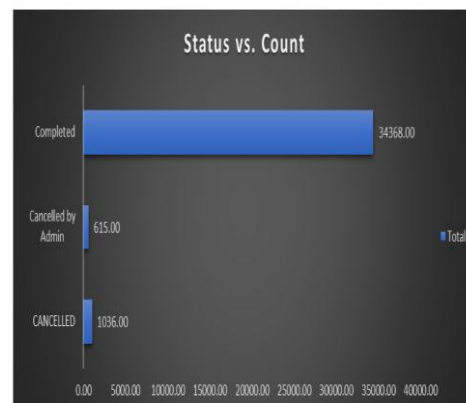
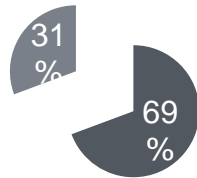


Fig 3- Count of number of tasks completed & cancelled

INTERPRETATION : The data from the Porter management system in hospitals provides an overview of the status of tasks requested through the platform. The majority of tasks, 34,368 in total, have been successfully completed, indicating efficient task execution and timely service delivery by the porters (Fig 3).



6.3.4. NUMBER OF USERS USING THIS APPLICATION :



■ Endusers ■ Porters
Fig:4- Number of users using this application

INTERPRETATION: Figure 4 indicates the number of end users and porters utilizing the Porter Management System in hospitals. With 113 end users, the system experiences a significant demand from hospital staff or patients who use the application to raise tasks such as asset movement, medicine return, and more.

VII. INFERENCES

- ▶ The data from the Porter Management System used in hospitals reveals a wide spectrum of tasks that users have requested through the platform. Among these services, Asset movement (1628), Blood bank transfer (1297), CABG (35), Case sheet movement (2191), Central pharmacy (28), General stores (6), Medicine return (1844), Sterile (3558), Stretcher transfer (9798), Unsterile (918), and Wheelchair Transfer (14714) requests. The data highlights the necessity of a well-organized and efficient Porter Management System to handle the diverse range of tasks effectively, improving patient care, staff productivity, and overall hospital operations.
- ▶ The data presents the average time taken in minutes to complete different services requested through the Porter Management System in hospitals. It offers insights into the efficiency and duration of task execution. Average time taken for Asset movement (13:34), Blood bank transfer (15:32), CABG (23:31), Case sheet movement (13:22), Central pharmacy (13:36), General stores (10:34), Medicine return (14:47), Sterile (08:59), Stretcher transfer (21:46), Unsterile (09:33), and Wheelchair transfer (16:30). Analyzing the average times provides valuable feedback for process optimization and resource allocation. A well-implemented Porter

Management System can use this data to identify bottlenecks, enhance task efficiency, and improve overall hospital operations. Ensuring the prompt completion of critical tasks while maintaining quality care is crucial to deliver a positive impact on patient experience and overall hospital performance.

- ▶ The data from the Porter management system in hospitals provides an overview of the status of tasks requested through the platform. The majority of tasks, 34,368 in total, have been successfully completed, indicating efficient task execution and timely service delivery by the porters. However, there are instances of task cancellations, with 1,036 tasks being cancelled by users and 615 tasks being cancelled by administrators. Task cancellations can be attributed to various reasons, such as changes in patient conditions updated priorities, or redundant requests. Analyzing the reasons behind cancellations can help identify areas for improvement in communication and task allocation.
- The data indicates the number of end users and porters utilizing the Porter Management System in hospitals. With 113 end users, the system experiences a significant demand from hospital staff or patients who use the application to raise tasks such as asset movement, medicine return, and more. To cater to these requests, the system relies on 50 porters responsible for completing the assigned tasks. Porters had limited visibility into the overall task schedule and were unable to receive real-time updates or changes to assignments. As a result, there were frequent instances of tasks being assigned to the wrong porters, leading to confusion and rework. Workload balancing was also a challenging task, as it required manual assessments of porter availability and capacity. Some porters were overburdened with tasks, while others remained underutilized, leading to suboptimal resource allocation. Overall, the manual approach to porter management led to inconsistencies in service delivery, increased waiting times for patients, and reduced operational efficiency.

VIII. OBSERVATIONS

8.1 BEFORE IMPLEMENTATION :

Prior to the implementation of the Porter Management Application in hospital, the porter workforce relied on manual and traditional methods for task allocation and coordination. Supervisors communicated tasks to porters through



verbal instructions, written notes, or phone calls. This manual process often resulted in miscommunication and misunderstandings, leading to delays and

8.2 AFTER IMPLEMENTATION :

Following the successful implementation of the Porter Management Application in hospitals, the entire process of porter task allocation and coordination has been revolutionized. The application provides a centralized platform where supervisors can electronically assign tasks to porters with detailed information, including patient details, destination, and priority. Porters receive instant notifications of new tasks, enabling them to respond promptly and efficiently. Real-time tracking features allow supervisors to monitor porter movements within the hospital premises, ensuring tasks are completed in a timely manner. The application also incorporates intelligent routing algorithms that optimize porter paths, minimizing travel time and maximizing efficiency. Workload balancing is now automated, with the system considering porter availability and workload to ensure fair distribution of tasks. As a result, each porter receives a workload that aligns with their capacity, reducing the risk of burnout and enhancing overall job satisfaction.

8.3 OVERALL COMPARISON:

Before Implementation	After Implementation
75 Porters	50 Porters
NO TAT	We can generate TAT
No Reports	We can get Reports
No Real time tracking of Porters	We can track real time
Miscommunication	No Miscommunication
No Capital Investment	Need some Capital Investment

IX. CONCLUSION

In conclusion, the implementation of the Porter Management System in hospitals has brought about a transformative change in operational efficiency and task coordination. Before the system's adoption, manual communication led to frequent miscommunication and inefficiencies in task allocation. However, with the automated system, real-time task assignment

and updates, miscommunication minimized, resulting in faster response times and improved task execution. The system's intelligent routing has optimized task allocation, ensuring equitable distribution of tasks among porters and enhancing resource utilization. Real-time tracking has facilitated better coordination and reduced delays in task completion.

Overall, the Porter Management System has streamlined porter operations, leading to reduced waiting times for patients and increased overall efficiency. The successful implementation of this system has not only improved porter performance but also positively impacted the hospital's service delivery and patient care. The findings highlight the system's effectiveness in creating a more organized, efficient, and patient-centric hospital environment.

X. LIMITATIONS

While the porter management system brings numerous benefits to hospital operations, it can also have certain limitations that need to be acknowledged :

- Implementing a new system requires initial setup, data migration, and integration with existing hospital systems. This process can be time consuming and may require additional resources and technical expertise.
- Hospital staff and porters need to adapt to the new system, which may require training and familiarity with the application. Resistance to change or lack of adequate training could hinder user adoption and impact system effectiveness.
- The system's performance can be affected by technical issues, such as server downtime, connectivity problems, or software bugs. Dependence on technology makes the system vulnerable to such challenges.
- The application handles sensitive patient information, and data security and privacy must be a top priority. Ensuring compliance with data protection regulations is essential to safeguard patient confidentiality.

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